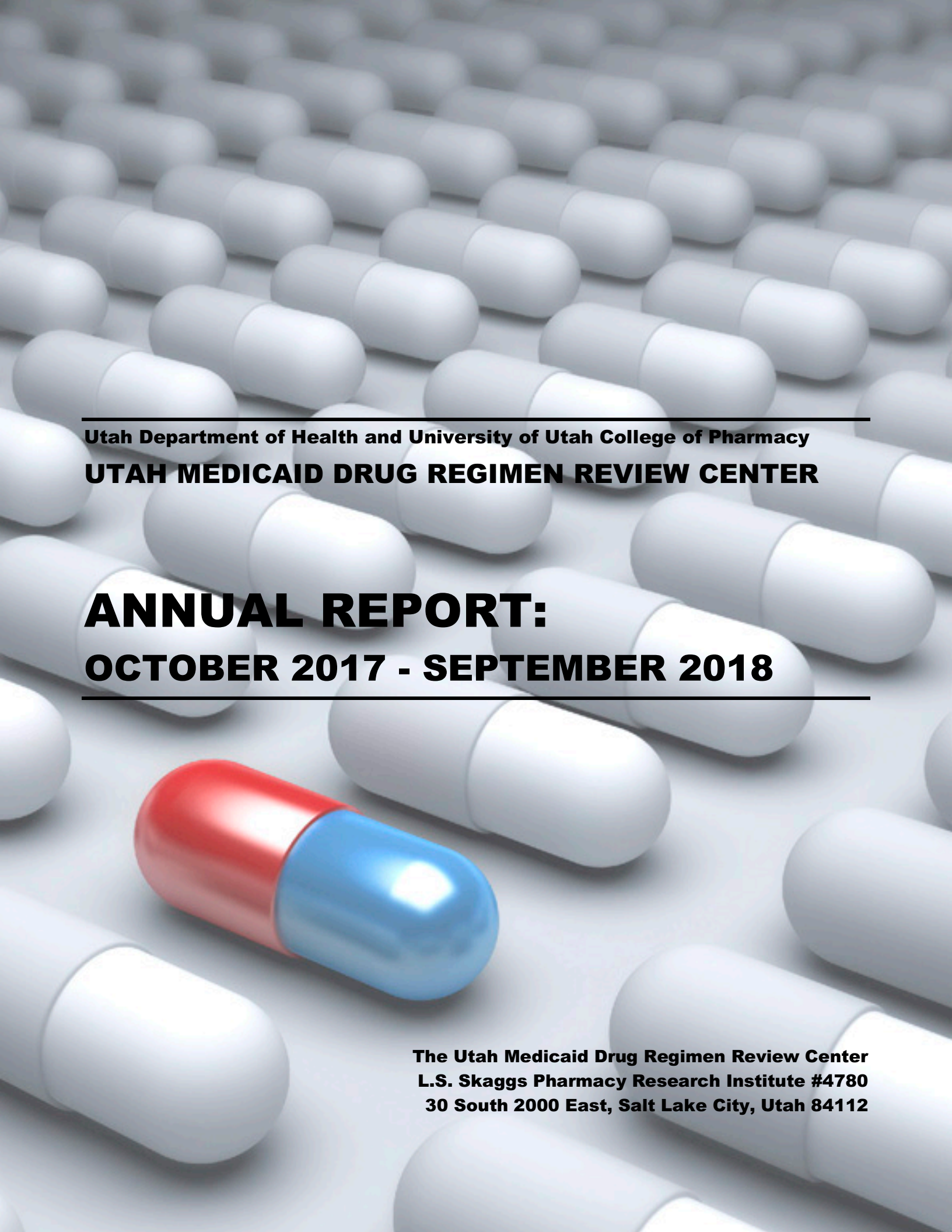

Utah Department of Health and University of Utah College of Pharmacy

UTAH MEDICAID DRUG REGIMEN REVIEW CENTER

ANNUAL REPORT:

OCTOBER 2017 - SEPTEMBER 2018

The Utah Medicaid Drug Regimen Review Center
L.S. Skaggs Pharmacy Research Institute #4780
30 South 2000 East, Salt Lake City, Utah 84112

COLLEGE OF PHARMACY
UNIVERSITY OF UTAH
L. S. SKAGGS PHARMACY INSTITUTE

and

Utah Medicaid

DRUG REGIMEN REVIEW CENTER ANNUAL REPORT

October 1, 2017 – September 30, 2018

Submitted to:
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Tuesday, June 11, 2019

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INTRODUCTION

The College of Pharmacy at the University of Utah began operating its Drug Regimen Review Center (DRRC) in May 2002 to fulfill the terms of a contract with the Utah State Department of Health (DOH). The contract supports the Utah Medicaid prescription drug program and its drug utilization review process. The emphasis of the program is to improve the safety and efficacy of drug use in Medicaid patients, reduce the number of prescriptions and drug costs for frequent utilizers of the Medicaid drug program, and to support and educate the medical professionals who prescribe to Medicaid recipients.

Each month, a group of patients is selected using an array of methods described herein, and a team of clinical pharmacists reviews each patient. These reviews result in recommendations made to prescribers (also described herein). Recommendations are sent, primarily via fax, to all prescribers of medications related to the identified drug therapy problems (DTPs). Faxed materials include a list of drugs dispensed during the month of review. The DRRC also provides information and consultation by telephone to prescribers and pharmacists when appropriate.

Mission

The three primary missions of the DRRC are:

1. Conduct retrospective, patient-level drug utilization review of the drug therapy of Utah Medicaid patients who meet criteria for high risk or utilization;
2. Support the Medicaid Drug Utilization Review (DUR) Board's requirement to conduct retrospective and prospective drug utilization review by providing reports of patient-level utilization and evidence-based recommendations for minimizing risks of future DTPs; and
3. Support the Utah Medicaid Pharmacy and Therapeutics (P&T) Committee by providing systematic reviews of the evidence for comparative safety and efficacy for medications under consideration for inclusion on Medicaid's preferred drug list (PDL).

Staff

The DRRC utilizes a staff of professionals to run the program:

Program Director:

- Joanne LaFleur, PharmD, MSPH

Faculty:

- Joanita Lake, BPharm, MSc EBHC (Oxon)
- Lauren Heath, PharmD, MS

Clinical Pharmacists:

- Vicki Frydrych, BS, PharmD
- Valerie Gonzales, PharmD

Medical Writing:

- Elena Martinez, BPharm, MSc MTSI

Data Management:

- Jacob Crook, MStat

Administration:

- Kristin Knippenberg, MFA
- Jennifer Larson

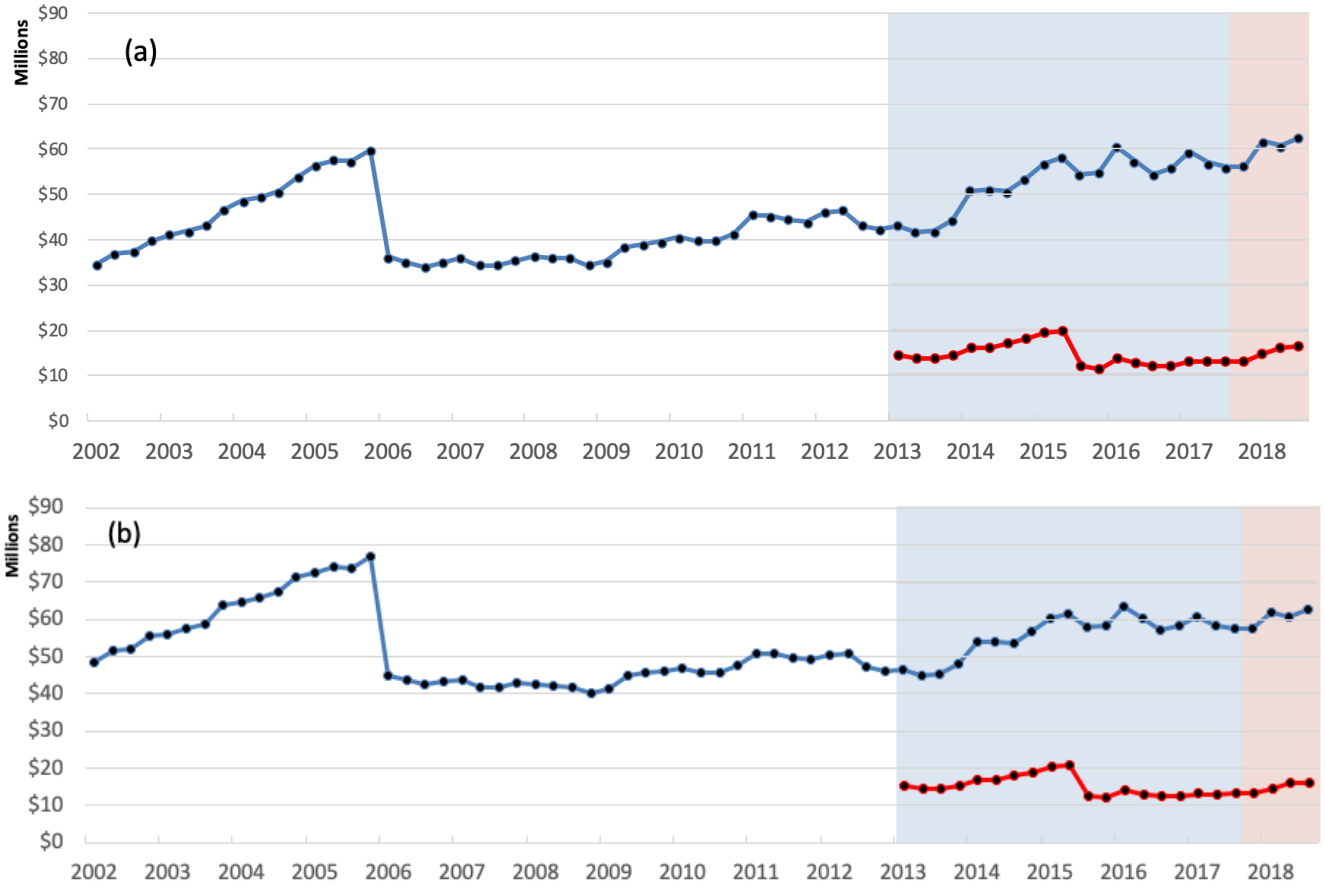
Program Rationale

The program's rationale hinges on historical changes in pharmacy expenditures.

Pre-Part D era

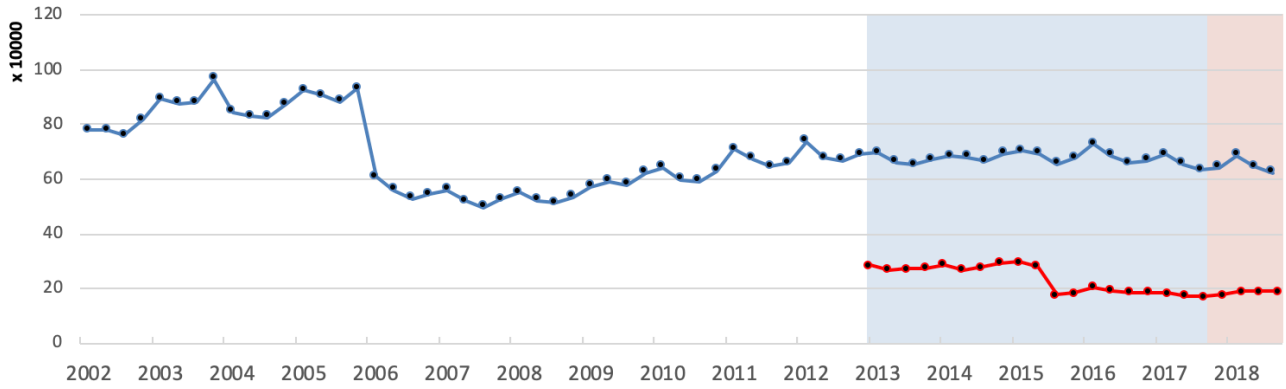
For the Utah Medicaid drug program, total pharmaceutical expenditures have been trending upward, even after accounting for inflation, since 2002 when we first began to examine them.[1] Total monthly Medicaid pharmacy expenditures were $11.7 million per month in January 2002 (equivalent to $16.4 million in 2018 dollars). By December 2005, just prior to the implementation of Medicare Part D for elderly Medicare recipients, expenditures had increased to more than $20.7 million per month (equivalent to $26.4 million in 2018 dollars): an unadjusted 76.9% increase over 4 years, or 61.0% after adjusting for inflation. These trends are summarized in Figures 1-6.

Figure 1. Unadjusted (a) and inflation-adjusted[a] (b) quarterly Medicaid pharmacy expenditures overall, from January 2002 through September 2018 (blue line), and the FFS subset, from January 2013 through September 2018 (red line). Shaded areas correspond to the post-ACO era. Red shading corresponds to the current reporting period of October 2017-September 2018.



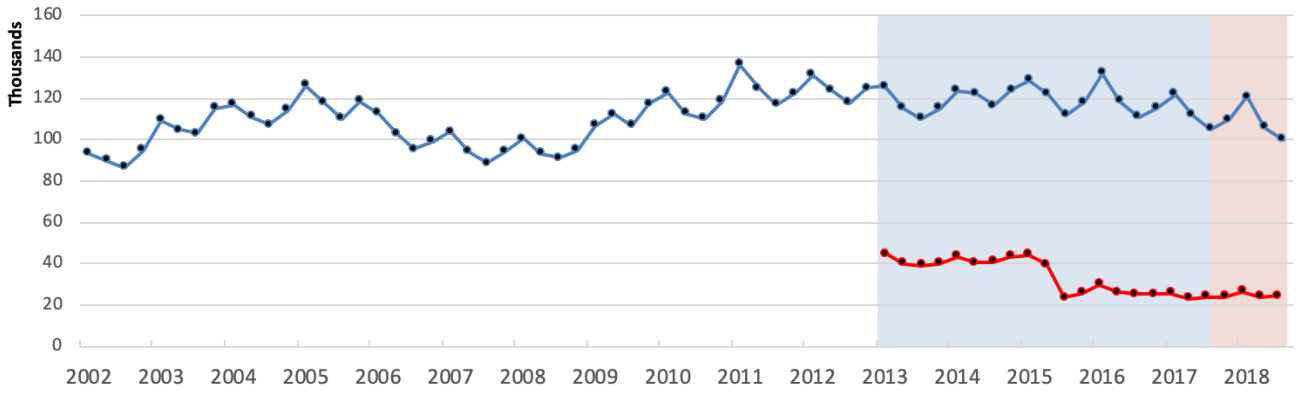
[a] *Adjusted using the Consumer Price Index (CPI) reported by the United States Bureau of Labor Statistics (BLS) and reported in 2018 dollars.*
Abbreviations: FFS – fee-for service; ACO – accountable care organization

Figure 2. Quarterly number of Medicaid pharmacy claims overall, from January 2002 through September 2018 (blue line), and the FFS subset, from January 2013 through September 2018 (red line). Shaded areas correspond to the post-ACO era. Red shading corresponds to the current reporting period of October 2017-September 2018.



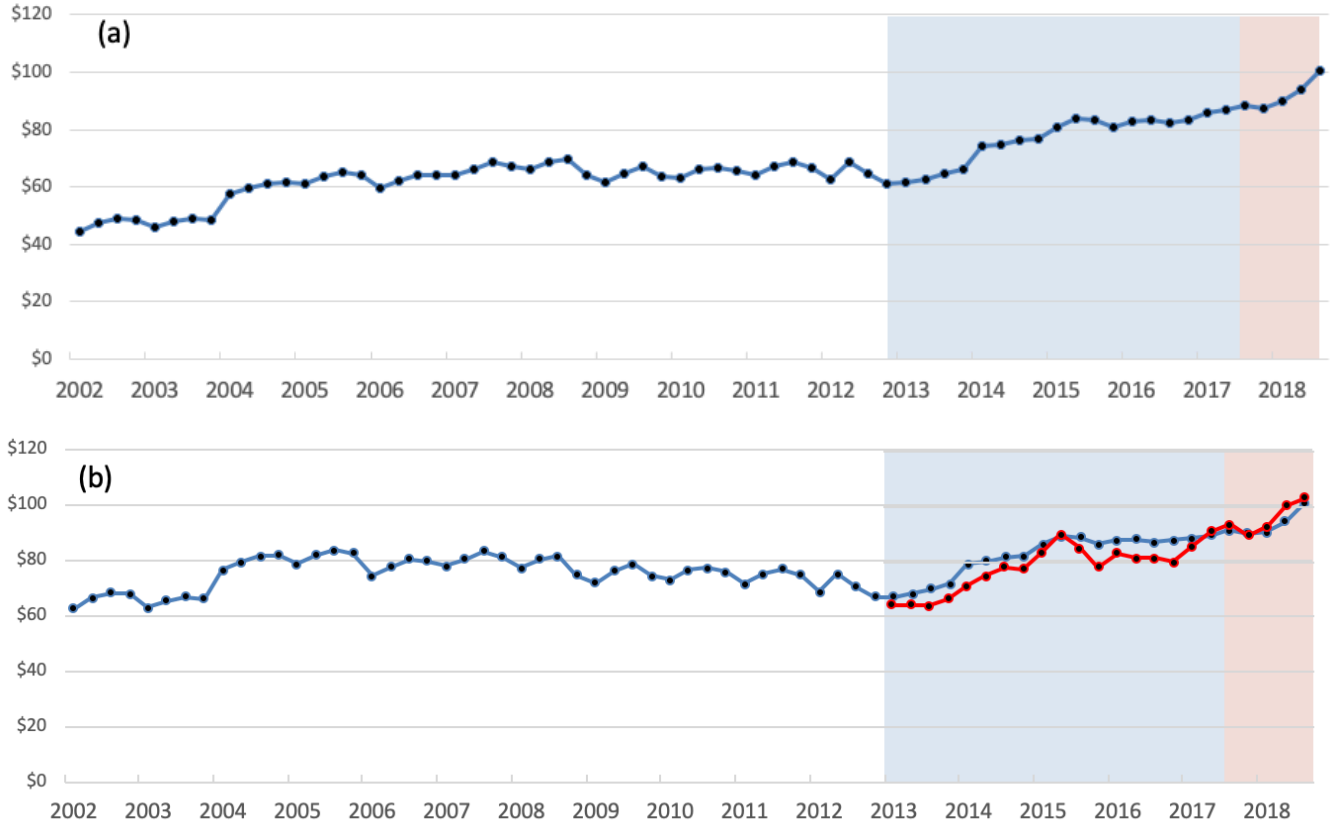
Abbreviations: FFS – fee-for service; ACO – accountable care organization

Figure 3. Quarterly number of Medicaid recipients filling pharmacy claims overall (blue line), from January 2002 through September 2018, and the FFS subset (red line), from January 2013 through September 2018. Shaded areas correspond to the post-ACO era. Red shading corresponds to the current reporting period of October 2017-September 2018.



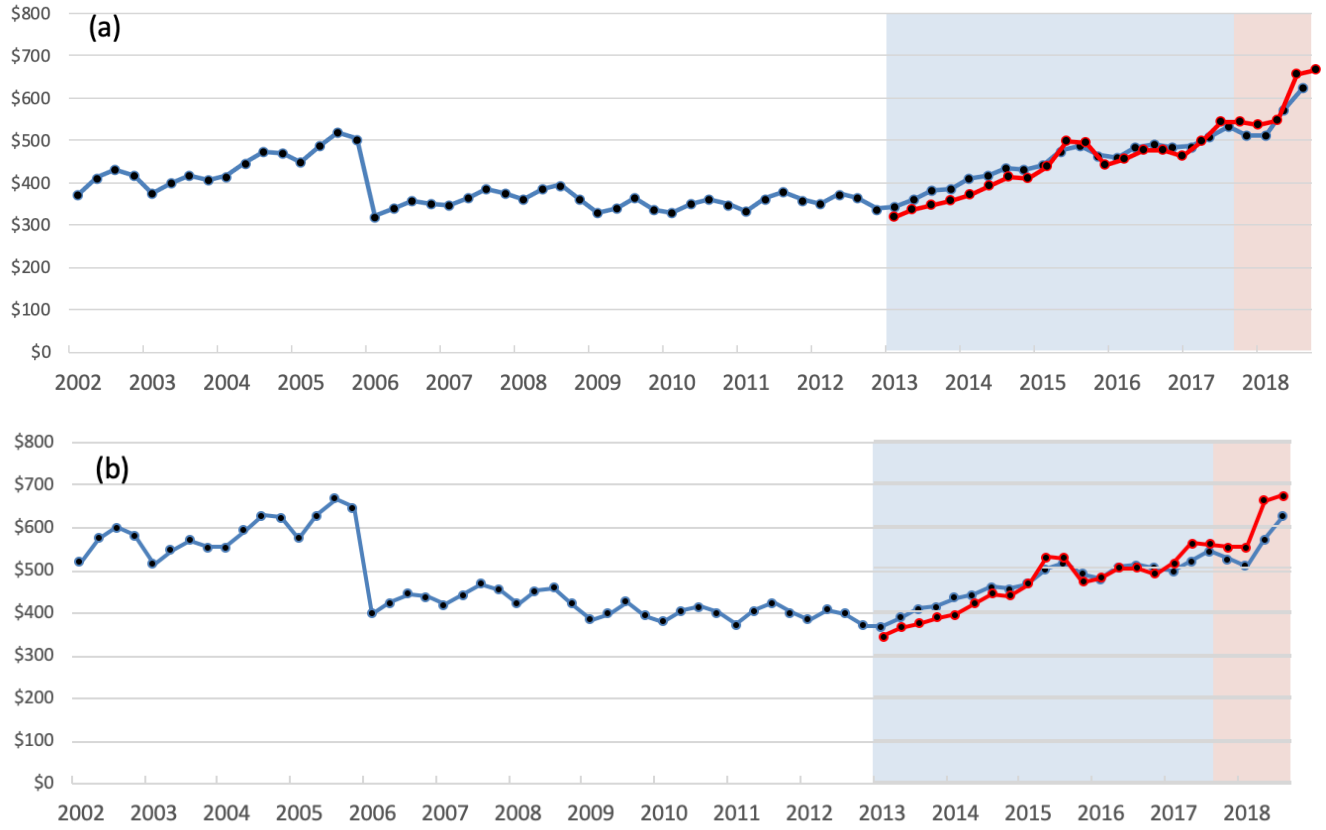
Abbreviations: FFS – fee-for service; ACO – accountable care organization

Figure 4. Unadjusted (a) and inflation-adjusted[a] (b) quarterly average expenditure per Medicaid pharmacy claim overall, from January 2002 through September 2018 (blue line), and the FFS subset, from January 2013 through September 2018 (red line). Shaded areas correspond to the post-ACO era. Red shading corresponds to the current reporting period of October 2017-September 2018.



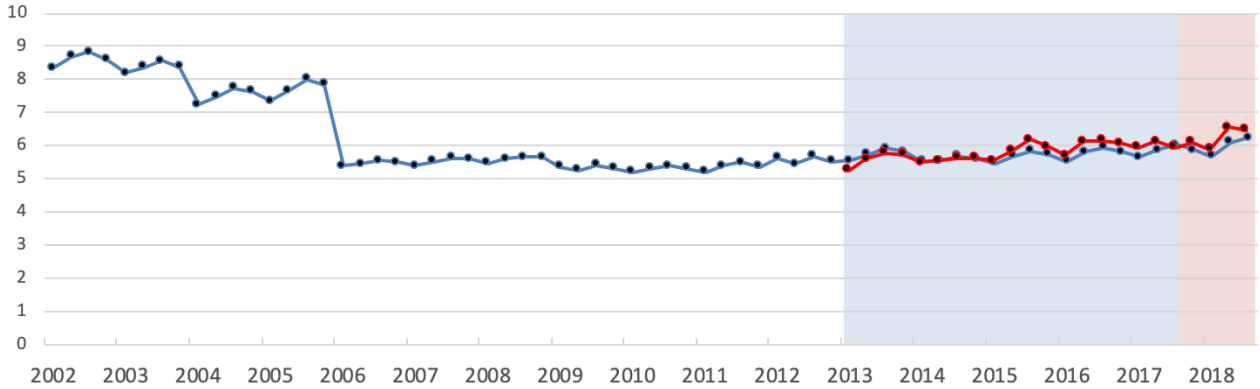
[a] Adjusted using the Consumer Price Index (CPI) reported by the United States Bureau of Labor Statistics (BLS) and reported in 2018 dollars.
Abbreviations: FFS – fee-for-service; ACO – accountable care organization

Figure 5. Unadjusted (a) and inflation-adjusted[a] (b) quarterly average expenditure per Medicaid recipient receiving pharmacy claims overall, from January 2002 through September 2018 (blue line), and the FFS subset, from January 2013 through September 2018 (red line). Shaded areas correspond to the post-ACO era. Red shading corresponds to the current reporting period of October 2017-September 2018.



[a] *Adjusted using the Consumer Price Index (CPI) reported by the United States Bureau of Labor Statistics (BLS) and reported in 2018 dollars.*
Abbreviations: FFS – fee-for-service; ACO – accountable care organization

Figure 6. Quarterly average number of claims per Medicaid recipient receiving pharmacy claims overall, from January 2002 through September 2018 (blue line), and the FFS subset, from January 2013 through September 2018 (red line). Shaded areas correspond to the post-ACO era. Red shading corresponds to the current reporting period of October 2017-September 2018.



Abbreviations: FFS – fee-for service; ACO – accountable care organization

The increases in the pre-Part D period can be explained by a combination of factors, including increases in utilization (i.e., numbers of claims and enrollees), and perhaps more importantly, increases in the average expenditure per pharmacy claim. During the same period, the total numbers of claims increased from 268,000 to 326,000 claims per month, a 21.7% increase. At the same time, the average per-claim expenditure increased from $43.81 to $63.32, an increase of 44.5%. After adjusting for inflation, and reporting in 2018 dollars, this is equivalent to an increase from $61.32 to $80.83 per claim, or a 31.8% increase. Increasing drug prices were the largest contributor to increases in expenditures during those years.

Post-Part D

After the implementation of Medicare Part D, when Medicaid/Medicare dually-eligible patients switched to their Part D benefits, total pharmacy expenditures sharply declined. In a single month from December 2005 to January 2006, there was a 39.8% decline in expenditures, from $20.6 million in one month to $12.4 million in the next. That decline was explained almost exclusively by decreases in utilization. The number of claims from December to January that year went from 326,000 to 213,000, a 34.7% decrease. The average cost per prescription between those two months temporarily declined also, but only by 7.7% unadjusted ($63.32 to $58.46) or 9.6% adjusted ($80.83 to $73.07) per claim, perhaps as some of the more expensive drugs prescribed to elderly patients moved to Medicare. However, the average cost per claim was back up to pre-Part D levels within 6 months. Utilization (in terms of claims per month) has never returned to pre-Part D levels.

In the years that followed the implementation of Medicare Part D, Utah Medicaid pharmacy expenditures have continued to climb, surpassing pre-Part D levels for total expenditures and peaking at $22.5 million per month by July 2018, an unadjusted 92.3% increase (or an adjusted 37.2% increase) from January 2002. The post-Part D increases are explained primarily by the marked increases in the average expenditure (1) per claim and (2) per patient receiving pharmacy claims that started in 2013, when the Affordable Care Act (ACA) was implemented.

Accountable Care Organizations (ACOs)

Expenditure increases have continued since the Affordable Care Act (ACA) provision for Accountable Care Organizations (ACOs) began in January 2013. In that month, Utah Medicaid patients in Weber, Davis, Salt Lake, and Utah counties were required to enroll in one of 4 ACOs in the state of Utah (i.e., Healthy Choice, Healthy U, Molina, and SelectHealth).[2] Nonetheless, total drug expenditures continued to climb.

In January 2013, the first month of ACO implementation, 35.0% of the 253,400 pharmacy claims paid by Medicaid were for FFS patients, which accounted for 32.2% of the costs. Between January 2013 through June 2015, FFS patients accounted for an average of 34.2% of the total claims and 32.6% of the total costs in every month. In that period, average expenditures per claim among FFS patients were 4.7% lower than the average expenditure per claim overall in those months.

In July 2015, Medicaid members in 9 additional counties were required to enroll in an ACO, including Box Elder, Cache, Iron, Morgan, Rich, Summit, Tooele, Wasatch, and Washington counties. [3] That month, the total number of Medicaid pharmacy expenditures and claims accounted for by FFS patients declined again as many more rural patients enrolled in ACOs. The pharmacy expenditures among FFS patients went from $6.7 million in June to $4.0 million in July 2015, a 40.3% decrease. The number of claims went from 75,400 to 48,900, a 35.1% decrease.

Since the July 2015 change in ACO enrollment requirements, total expenditures have remained relatively stable, at an average of approximately $19.3 million per month overall and $4.4 million per month in the FFS subset (or $19.8 million per month overall and $4.5 million in the FFS subset, adjusted). FFS expenditures have averaged approximately 22.7% of the total expenditures in each month. Similarly, utilization has also remained relatively constant, at an average of 222,000 claims per month overall and 51,000 claims per month in the FFS subset. FFS utilization has averaged approximately 23.0% of the total number of claims per month. The average expenditure per claim has continued to climb steadily through the end of the current reporting period: from $89.22 per claim overall and $87.03 per claim in the FFS subset to $93.77 overall and $98.80 in the FFS subset, after adjusting for

inflation (increases of 5.1% and 13.5%, respectively). However, the mean expenditure per claim has been approximately 1.5% lower in the FFS compared to all Medicaid recipients in this period.

In the upcoming 2018-2019 reporting period, Medicaid will be expanded within the State of Utah. We expect an initial increase in FFS patients, which will likely decline in subsequent months as patients switch to ACOs.

Current Reporting Period

Figures 7-14 show the changes in drug costs and utilization for Medicaid overall and for the FFS subset in the current reporting period, along with some contributing causes to the overall changes in cost. During the current reporting period (October 2017 through September 2018), the total number of claims decreased among all Medicaid patients from 221,918 to 198,666 per month (a 10.5% decrease). Among the FFS subset, claims increased very slightly, from 50,364 to 51,641 per month (a 2.5% increase). Drug expenditures among all patients decreased slightly during the period, going from $19.0 million to $18.6 million per month (a 2.1% decrease). Among the FFS subset, drug expenditures increased from $4.4 million to $5.1 million per month (a 15.9% increase). This unusually large increase is primarily attributable to a 12.6% increase in the average expenditure per claim (from $87.77 to $98.80) and a modest 2.0% increase in the number of patients filling prescriptions (from 15,366 to 15,666).

Goals of the Drug Regimen Review Center (DRRC)

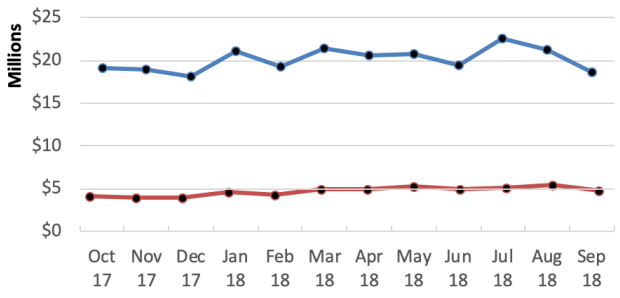
Consistent with the goal of keeping Utah Medicaid drugs affordable is a need for ongoing review of the quality and safety of prescribing by Medicaid providers. The DRRC has produced numerous evidence-based recommendations for the Medicaid P&T Committee and criteria sets for the Medicaid DUR Board. Pharmacist reviews of pharmacotherapy for Medicaid patients have also been associated with improved quality of drug therapy as well as improved clinical and economic endpoints.

Summary of Services

The DRRC services Medicaid providers, the Medicaid DUR Board, and the Medicaid P&T Committee as follows:

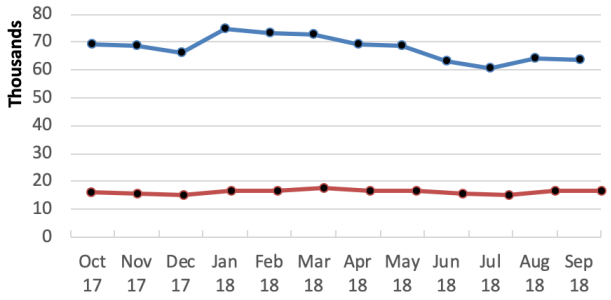
- The DRRC reviews the drug therapy of Medicaid patients and works with individual Medicaid prescribers to provide the safest and highest-quality pharmacotherapy at the lowest cost possible. Since 2002, the DRRC has conducted approximately 150-300 patient reviews per month based on evolving criteria.
- The DRRC submits monthly reports and presentations to the DUR Board. These reports focus on the role of selected agents among other treatments and on the utilization of these agents in the Utah Medicaid population to ensure appropriate and medically necessary use while considering potential safety, abuse and misuse issues. The DRRC has been providing this service since 2012.
- The DRRC also submits reports to the P&T Committee, consisting of a systematic review of the evidence for safety and efficacy of drug classes, utilization data, and available agents and dosage forms. The DRRC has been providing this service since 2010.

Figure 7. Overall (blue) and FFS (red) monthly pharmacy expenditures in the reporting period



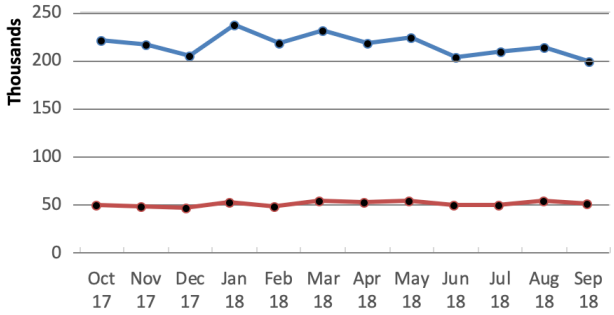
Key: FFS – fee-for-service

Figure 8. Overall (blue) and FFS (red) monthly number of patients with pharmacy expenditures in the reporting period



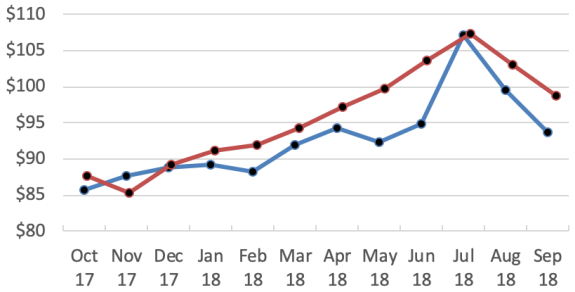
Key: FFS – fee-for-service

Figure 9. Overall (blue) and FFS (red) monthly number of pharmacy claims in the reporting period.



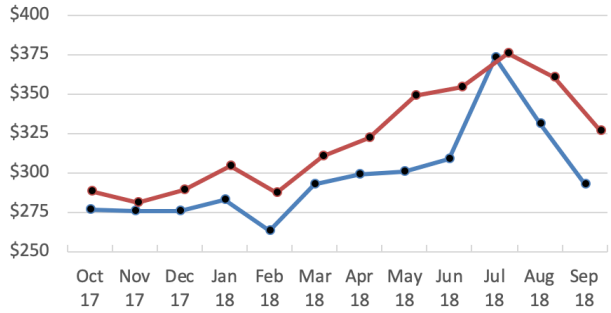
Key: FFS – fee-for-service

Figure 10. Overall (blue) and FFS (red) average pharmacy expenditure/claim in the reporting period.



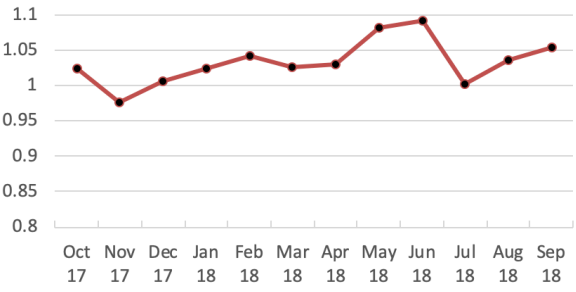
Key: FFS – fee-for-service

Figure 11. Overall (blue) and FFS (red) monthly pharmacy expenditures/patient among those with pharmacy claims in the reporting period.



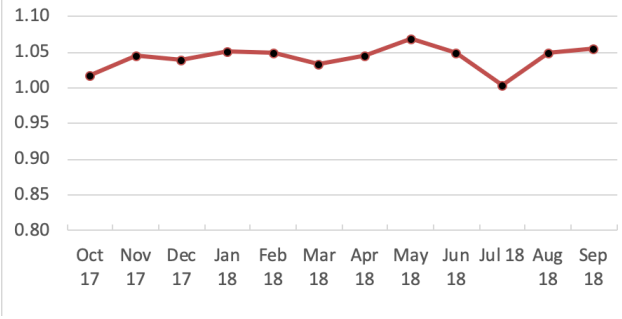
Key: FFS – fee-for-service

Figure 12. Average expenditure per FFS pharmacy claim as a proportion of average expenditure/pharmacy claim overall.



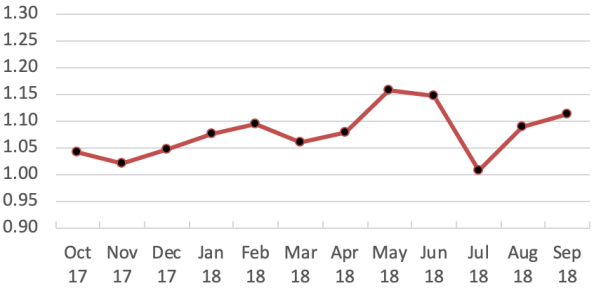
Key: FFS – fee-for-service

Figure 13. Average number of claims/FFS patient as a proportion of average number of claims/patient overall.



Key: FFS – fee-for-service

Figure 14. Average pharmacy expenditure/FFS patient as a proportion of average expenditure/patient overall.



Key: FFS – fee-for-service

SECTION 1: PATIENT REVIEWS

Past Patient Review Methodologies

From the program's inception in 2002 through October 2008, the selection criteria for pharmacist review of patient drug regimens were relatively simple and straightforward: patients who exceeded 7 prescriptions per month were ranked by the number of prescriptions they received in that month, and the top 300 were selected after excluding children and patients who had been reviewed in the previous 12 months.

In 2008, the methods of patient selection were modified significantly. The number of patients selected for review each month was reduced from 300 to 150, and three distinct rules for selection were implemented. Each of these new rules was used to select an average of 50 patients per month:

1. Prescription drug counts: An average of 50 patients per month were selected on the basis of fill count per month, the same mechanism that had been used previously. In each month, patients who received any prescription were ranked according to the number of prescriptions they received in that month, and those with the highest numbers of prescriptions who had not been reviewed in the prior 12 months were selected.
2. RxRisk comorbidity scores: An average of 50 patients per month were selected on the basis of RxRisk comorbidity scores. RxRisk is a risk-adjustment instrument that is based on degree of comorbidity, as measured by prescriptions filled over one year.[4] The RxRisk comorbidity scale has been validated to identify patients at risk of having (a) high medical expenditures and (b) death in the subsequent year.
3. RxRisk chronic diseases: An average of 50 patients per month were selected on the basis of the count of chronic diseases they had, according to the RxRisk comorbidity scale. Patients were ranked according to the number of comorbid conditions based on drugs filled in the prior year, and those with the highest count who had not been reviewed in the previous 12 months were selected.

In 2011 the method of patient selection was modified again. The RxRisk chronic diseases rule (number 3, above) was eliminated and replaced with a single "variable rule," or combination of variable rules, created by the DRRC team of pharmacists. These rules were designed to target and address specific and prevalent problems that had been observed in the general FFS Medicaid population. The approximately 50 patients who were selected using the targeted intervention criteria each month underwent a six-month re-evaluation to determine if the targeted drug therapy problems (DTPs) were still prevalent among the reviewed subset.

In January 2013, and then again in July 2015, a statewide policy decision modified the population eligible for selection by the DRRC using the 3 selection criteria described above (i.e., a high number of prescriptions, a high comorbidity score, and a monthly variable clinical rule). Under a Utah State Department of Health (DOH) policy, effective January 1, 2013, Medicaid patients living in the state's four urban counties (i.e., Salt Lake, Utah, Davis and Weber) were required to enroll in one of four private-sector accountable care organizations (ACOs), and patients living in the 25 rural counties were eligible to voluntarily enroll. Most pharmacy claims among ACO patients were processed and paid through those organizations. Given that each of the ACOs likely conducts their own drug utilization review (DUR) programs, patient reviews completed by the DRRC program were limited to the remaining traditional FFS Medicaid patients, including those not enrolled in an ACO and living primarily in the state's 25 rural counties. In July 2015, enrollment in ACOs became mandatory in an additional 9 counties.

From initiation of the program in 2002 through September 2018, using all methods of patient selection since the program's inception, the DRRC has reviewed 28,349 patients. Of these patients, 15,511 unique patients (54.7%) had a concern for which the pharmacist chose to contact the prescriber. Approximately 64,000 reports have been submitted to more than 6,800 prescribers via fax, phone, mail, or email from 2002 through the current reporting period. Most Medicaid prescribers have received multiple reports from the DRRC over the years. More than half of all patients reviewed have had reports sent to prescribers on their behalf multiple times.

Present Patient Review Methodology and Selection Criteria

In order to target commonly occurring drug therapy issues in the general Medicaid population, we presently select approximately 150 FFS patients for review each month based on three methods: (1) greatest number of prescription drug fills, (2) high comorbidity (RxRisk) scores, and (3) a series of variable rules that are changed from month to month, if appropriate. Patients selected on the basis of the variable rule undergo a targeted intervention, with re-evaluation after 6 months. Table 1 summarizes the variable rules that were used in each month during the current reporting period.

Table 1. Variable rule criteria used for targeted patient interventions between October 2017 and September 2018

Month Rule	Description	Drugs and/or diagnoses
Oct 17-Jun 18 Concurrent benzodiazepines and stimulants	To find patients who are receiving concurrent stimulants and benzodiazepines, first identify patients who have received a stimulant and a benzodiazepine within 30 days of each other, with one of the fills occurring during the month of review.	Stimulant defined as dexmethylphenidate, dextroamphetamine, dextroamphetamine-amphetamine mixed salts, lisdexamfetamine, or methamphetamine. Benzodiazepines defined as alprazolam, chlordiazepoxide, clonazepam, clorazepate, diazepam, estazolam, flurazepam, lorazepam, midazolam, oxazepam, quazepam, temazepam, or triazolam.
Oct 17-Jun 18 Antibiotic overuse	To find patients who appear to be overutilizing antibiotics, first identify all patients who received at least one antibiotic during the month of review, and four or more antibiotics during the eleven months prior to the month of review, for a total of five or more antibiotics during the past year. Exclude any patients who were hospitalized during the month of review, and any patients with a diagnosis for cancer, cystic fibrosis or cancer during the past year.	Antibiotic, Cancer, Cystic Fibrosis, Sickle Cell Disease and Hospitalization are defined as they were in the Medicaid DUR Board's October and November reports on Pediatric Antibiotic Utilization.
Jul 18-Sep 18 90-day prescriptions	To find patients filling 30-day prescriptions that Medicaid allows to be filled for 90day supplies, first identify all patients that have received any of these medications for 75% of the past 4 months. The threshold would be 3-30-day prescriptions over the most recent 4 months with a prescription for the medication in the current month of review.	Medication List: Amlodipine Atenolol Atorvastatin Bupropion ER Captopril Carbidopa/levodopa Carvedilol Cetirizine Citalopram Diltiazem Doxazosin Duloxetine Enalapril Escitalopram Famotidine Flovent Fluoxetine Fluticasone Furosemide Glimepiride Glipizide Hydrochlorothiazide Imipramine Labetalol Lamotrigine Levetiracetam Lisinopril Losartan Memantine Metoprolol succinate Metoprolol tartrate Pantoprazole Pravastatin Propranolol Quinapril Ramipril Ranitidine Simvastatin Spironolactone Topiramate Torsemide Valsartan Zonisamide Non-PDL inclusion Metformin tacrolimus.

When reviewing a patient selected by any method, the DRRC pharmacists may notice a pattern of prescription fills that suggests DTPs or inappropriate utilization of health care services on the part of that patient.[5-7] Table 2 summarizes definitions for the most common categories of DTPs included in reports that have been sent to prescribers since the inception of the program. The most common warning signs of inappropriate utilization are utilization of multiple physicians, pharmacies, emergency rooms or controlled substances in patterns that indicate likely abuse, uncoordinated care, or a lack of primary care. Patients displaying these patterns are flagged by DRRC pharmacists for potential referral to, and possible enrollment in, the Medicaid Restriction Program. The Medicaid Restriction Program provides safeguards against inappropriate and excessive use of

Medicaid services. The program provides a mechanism by which pharmacists, prescribers, and other health care providers can report suspicious behavior to Medicaid.

Table 2. Descriptions of drug-therapy problems (DTPs)

DTP	Description
Additive toxicity	The concomitant use of medications with similar pharmacodynamic actions that may produce excessive pharmacologic or toxic effects when given together. To minimize additive toxicity, a patient's drug regimen may need to be adjusted to include a decreased number of medications that cause a given toxicity.
Adherence	A pattern of refills that indicates that a patient is not adherent to a prescribed regimen that is intended to be used on an ongoing basis to treat a chronic disease.
Brand drug dispensed	The use of a brand-name medication when a less costly bioequivalent alternative is available.
Consider alternative	The use of a medication with no bioequivalent generic but with a less costly alternative agent in the same class. For some medications, different agents within the same class are therapeutically interchangeable and another drug can be selected without negatively impacting the patient's drug therapy.
Drug available over-the-counter (OTC)	The receipt of a medication by prescription when it is available over-the-counter (OTC). Although many OTC medications are clinically useful and less costly alternatives to prescription drugs, we ask providers to use their judgment as to whether or not patients can purchase the item themselves.
Drug-disease interaction	The use of a medication that is contraindicated due to the patient's age, gender, or disease state(s).
Drug-drug interaction	Increased toxicity or decreased therapeutic activity of one or more medications due to the concomitant use of another drug that affects its activity. Drugs that induce or inhibit hepatic metabolism, drugs that are highly protein-bound or drugs that affect the renal clearance of another are frequently involved in drug-drug interactions.
Excessive dose	The use of a medication above the recommended dosage range for a patient's age or condition.
Excessive duration	The use of a medication for longer than recommended for the patient's age or condition. Excessive duration of therapy may lead to additional adverse effects and toxicity.
Medication overuse	The frequent use of a medication or class of medications that are intended for acute treatment and not at frequent intervals.
Streamline therapy	The use of more tablets or capsules than necessary to achieve a desired dose or the receipt of separate dosage forms for two agents that are available in a combination product. Streamlining therapy could result in improved patient compliance and clinical outcomes.
Sub-therapeutic dose	The use of a medication below the recommended dosage range for the patient's age or condition. Sub-therapeutic dosing may cause patients to experience adverse effects without therapeutic benefit or may require the addition of other medications to control a disease state that could be controlled by the use of a single medication at an appropriate dosage level.
Therapeutic duplication	The inappropriate use of multiple medications for the same indication.
Treatment without an indication	The use of a medication without an apparent indication. Unnecessary exposure to medications may lead to increased risks of adverse events and toxicity.
Uncoordinated care	The prescribing of multiple medications for the same disease state by multiple providers. Uncoordinated care may result in insufficient monitoring of a patient's disease states and could lead to other drug-related problems such as drug-drug interactions, drug-disease interactions and therapeutic duplications.
Untreated indication	The absence of a medication that appears to be needed based on usual best practices or guidelines. Untreated indications could result in increased morbidity and mortality for a patient.

Efforts towards developing the DRRC's proprietary prescriber database have yielded better quality feedback from prescribers. Beginning in October 2009, every recommendation sent to a prescriber in a patient report has included a section asking that prescriber to provide his or her opinion about the general usefulness of the recommendation and the likelihood of implementation into the patient's existing drug regimen, each on a scale

of 1-5. Figure 15 shows an example of the feedback solicitation included with every DRRC recommendation. All feedback and prescriber comments are compiled into a monthly report for the DRRC pharmacists to review at monthly Quality Assurance (QA) meetings, where specific recommendations and general intervention protocols are reviewed and revised as needed.

Figure 15. Sample recommendation followed by feedback solicitation included with every DRRC recommendation.

ADHERENCE – HYPERTENSION AND HYPERLIPIDEMIA

ASSESSMENT: This patient has diagnoses of hypertension and hyperlipidemia but appears to be poorly adherent to the prescribed medications. In the past six months she has refilled prescriptions for a statin three times (once in Aug. '09 and twice in Jan '10) and lisinopril once (Jan '10).

RECOMMENDATION: Consider non-adherence as a factor if treatment failure occurs. You may wish to encourage adherence to the medication regimen at her next appointment.

	Not at all				Very	Comment
How useful did you find this information?	1	2	3	4	5	_____
How likely are you to implement this recommendation?	1	2	3	4	5	_____

☐ This recommendation does not apply to my experience with the patient.

Key: DRRC – Drug Regimen Review Center

We have compiled descriptive statistics regarding the effectiveness of the DRRC patient review program during October 2017 through September 2018, as well as qualitative descriptions of differences made in patient care for a few cases. Quantitative measures include changes in numbers of prescriptions for patients selected on that criteria and for all patients; changes in RxRisk score for patients selected on that criteria and for all patients; changes in patients needing targeted interventions 6 months after implementing interventions; changes in prevalence of DTPs; and changes in cost.

Although our program is not designed to target costs, costs may be impacted by the services we provide. Consequently, we tracked drug cost reimbursements for reviewed patients, stratified by selection method, for the remainder of the reporting period following the month they were reviewed. We track costs only for patients who remain eligible during the entire reporting period and who access their drug benefit at least once during each month in the reporting period. Reviewed patients from the FFS population are only tracked if they did not subsequently enroll in an ACO prior to September 2018. For each patient reviewed between October 2017 and September 2018, total drug cost during the review month is used as the baseline amount for comparison, and we assume stable drug costs with no increases. These baseline costs are compared with the drug costs for each subsequent month up until September 2018. For example, costs in May 2018 are compared with costs in June 2018, July 2018, August 2018 and September 2018 for those patients reviewed during May 2018. Savings for the same patients outside the current reporting period are not included in this report.

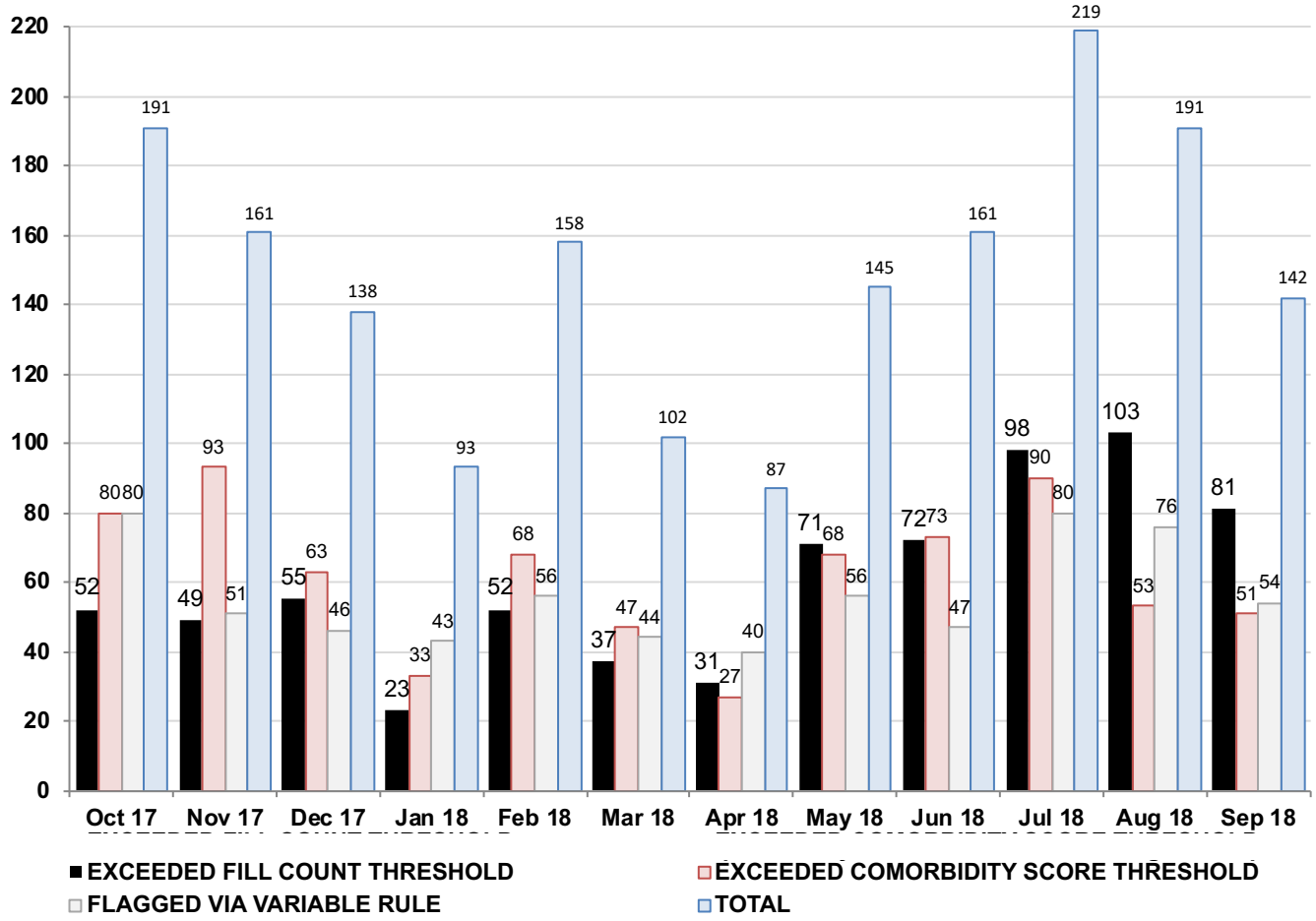
Results for Patient Reviews

Characteristics of Reviewed Patients

A total of 1,788 patients was reviewed during the current reporting period, corresponding to an average of 149 patients per month.[a] The number selected in each month, overall and by selection method, is summarized in Figure 16. The monthly totals are less than the sum of the three selection methods in each month whenever there is a patient included under more than one of the selection methods.

[a] *While we are contracted to review 150 patients per month, the average number of patients actually reviewed on a month-to-month basis varies depending on numbers of patients exceeding each threshold and/or meeting each variable rule and because the exact number of patients is a secondary consideration to the specific inclusion threshold. Overall, we guarantee that we review, at a minimum, the contracted number of 1,800 per patients per year across contract years.*

Figure 16. Numbers of patients reviewed according to each selection method, October 2017 through September 2018.



Demographics and some utilization and clinical metrics for each monthly review cohort are summarized in Table 3[b] and Figures 17 and 18. Most patients are females (58% to 75%). On average, males were younger than females, with ages ranging from 34.4 to 45.3 years for females and 22.4 to 46.9 years for males.

Table 3. Demographics of all reviewed patients

Month	Female				Male			
	Percentage of reviewed patients who were female	Mean age	Mean claim count	Mean expenditure per claim	Percentage of reviewed patients who were male	Mean age	Mean claim count	Mean expenditure per claim
Oct 17	66.4%	39.1	7.2	$68.93	33.6%	29.7	6.9	$84.12
Nov 17	58.1%	35.9	8.0	$81.74	41.9%	32.7	7.5	$102.00
Dec 17	69.1%	36.8	7.9	$96.25	30.9%	22.4	5.8	$97.88
Jan 18	68.4%	36.9	7.1	$65.09	31.6%	28.1	6.1	$74.25
Feb 18	58.8%	35.7	6.9	$72.88	41.2%	33.4	7.2	$137.17
Mar 18	74.7%	34.4	7.7	$66.27	25.3%	33.1	6.2	$84.63
Apr 18	58.6%	34.7	7.0	$51.44	41.4%	27.3	5.0	$54.66
May 18	67.9%	35.9	7.0	$94.98	32.1%	30.9	7.1	$95.38
Jun 18	66.7%	42.1	8.5	$79.59	33.3%	38.3	8.7	$87.86
Jul 18	59.5%	41.7	7.7	$117.81	40.5%	38.3	6.0	$75.55
Aug 18	60.8%	41.5	6.9	$95.47	39.2%	41.0	6.0	$140.08
Sep 18	65.0%	45.3	6.8	$77.67	35.0%	46.9	6.8	$128.67
Mean	64.5%	38.3	7.4	$80.68	35.5%	33.5	6.6	$96.85

[b] *Note: Assisted living facility patients and patients selected for review but subsequently not selected for intervention by the reviewing pharmacist are not included.*

Expenditures per prescription claim tended to be lower in females, ranging from $51.44 to $117.81 for females versus $54.66 to $140.08 for males. Females also tended to have a higher number of prescriptions per month, ranging from 6.8 to 8.5; in males it ranged from 5.0 to 8.7. This may be attributable to sex differences in healthcare utilization that have been observed across populations,[8] or it may have been skewed by the variable rules used during the current reporting period. The minimum number of prescriptions filled by patients in any month was 1 (for patients selected by rules other than the "exceeds the threshold for prescription claims" criterion); the maximum number of prescriptions filled by any patient in any month was 31, which occurred in October 2017.

Figure 17. Median and range for number of prescription fills received by all reviewed patients in October 2017-September 2018.

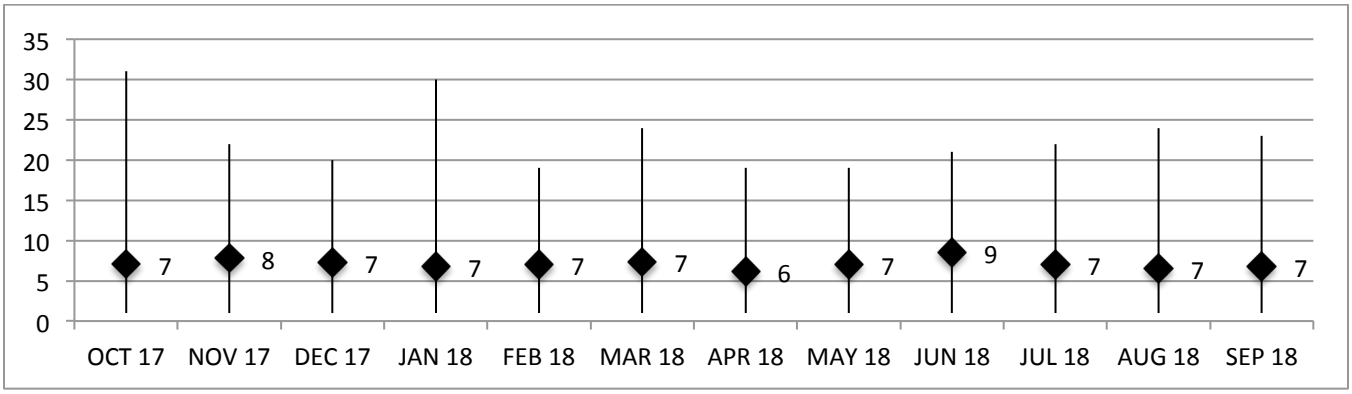
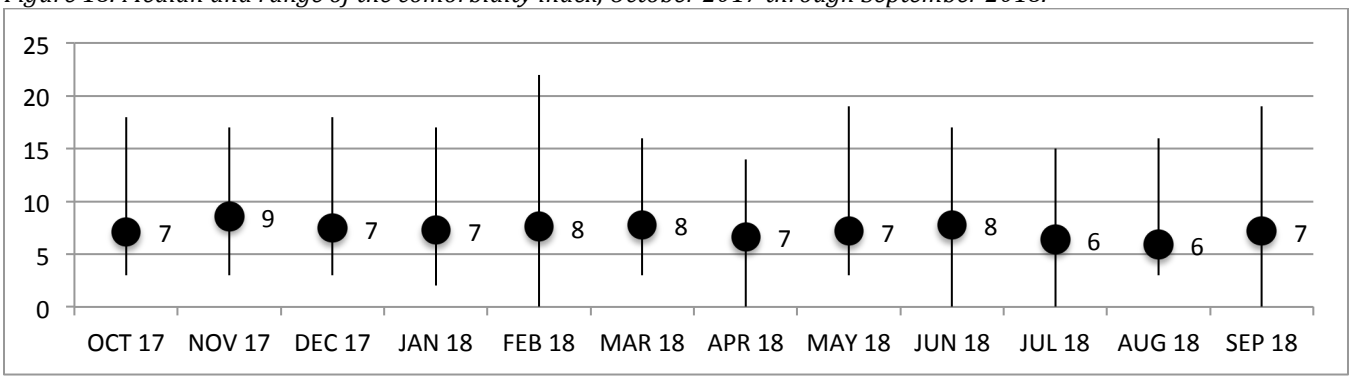


Figure 18. Median and range of the comorbidity index, October 2017 through September 2018.



Patients Selected for a High Number of Prescriptions Filled

A total of 724 patients (40.5%) who exceeded the minimum threshold for the fill count were flagged for review during the year. The thresholds for selection used in each month are summarized in Table 4. The threshold represents the smallest number of fills that reviewed patients could have if their only eligibility criterion was having high utilization. Figure 17 summarizes the median and range for the number of prescriptions among all reviewed patients; the mean number of prescriptions for all reviewed patients ranged from 6.19 to 8.54 during the reporting period. While the minimum threshold for count used to select patients for review ranged from 8 to 13, when considering patients selected by any rule, the median number of prescriptions among all patients reviewed generally ranged from 6 to 9.

Table 4. Minimum fill counts and comorbidity scores among patients selected for review, October 2017 through September 2018

Month	Threshold for prescription fill count qualifying for review	Threshold for comorbidity score qualifying for review
Oct 17	12	9
Nov 17	12	9
Dec 17	11	8
Jan 18	13	10
Feb 18	11	9
Mar 18	11	9
Apr 18	11	9
May 18	10	8
Jun 18	11	9
Jul 18	9	7
Aug 18	8	7
Sep 18	8	9

Patients Selected for a High Comorbidity Score

A total of 746 patients (41.7%) who exceeded the threshold for the RxRisk comorbidity score were flagged for review during the year. The thresholds for selection used in each month are also summarized in Table 4. Figure 18 shows the median and range of the comorbidity scores among all reviewed patients. While the minimum threshold for the comorbidity score used to select patients for review ranged from 7 to 10, when considering patients selected by any rule, the median score was between 6 and 9, while the maximum score was 22.

Patients Selected for Targeted Interventions with Monthly Variable Rules

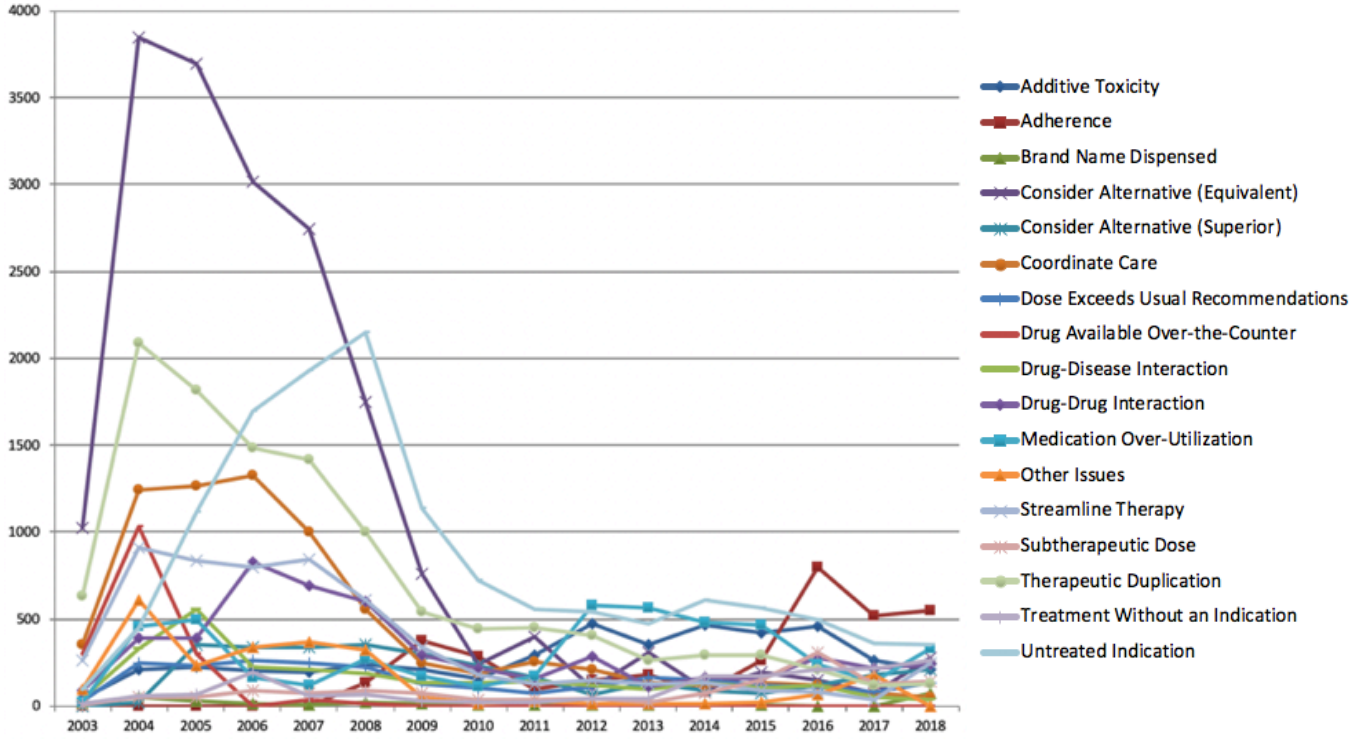
A total of 673 patients (37.6%) who met the criteria for at least one of the variable rules summarized in Table 1 were flagged for review during the year.[9] The patients selected each month using the variable rule/targeted intervention criteria undergo a 6-month re-evaluation to determine if the originally-identified DTPs are still present.

Results for drug therapy problems (DTPs)

Drug therapy problem (DTP) trends

Figure 19 summarizes the trends of DTPs identified in the reports sent to prescribers since the inception of the program in May 2002 through September 2018. There have been some substantial historical changes in the frequencies and types of DTPs identified over the years. While some part of these differences may be associated with different preferences across pharmacists for identifying and classifying DTPs, this phenomenon likely exerted only a small effect. We compared agreement across pharmacists for these classifications, and found that pharmacist agreement was generally high for most DTPs. [7] The differences observed are more likely to be explained by historical trends in Medicaid policies and the nature of the DRRC contracted work.

Figure 19. Historical patterns of drug therapy problems (DTPs) identified among reviewed patients since May 2002



The frequency of DTPs was generally higher in the first 6 years of our program. This was largely due to a couple of historical factors. Initially we reviewed twice as many patients – 300 per month, rather than the 150 per month we currently review – and most were identified on the basis of fill count. (In general, the more prescriptions a patient has, the greater the risk of DTPs. This is also shown in Table 5.) In October 2008. Our contracted number of patients declined to only 150 per month, and only one-third of them were selected on the

basis of fill count. That month also corresponds to a time when we saw the frequency of DTPs decline. Thus, numbers of patients reviewed and patient selection method likely account for the dramatic change in numbers of DTPs seen over time.

The change in the most prevalent DTPs is also likely a result of historical factors. The *consider alternative* recommendation was common in the early years of the DRRC program, most likely due to the fact that the Medicaid program did not implement a preferred drug list (PDL) until May 2009. The frequency of the *consider alternative* recommendation declined substantially in 2009 after the implantation of the PDL, and has since been one of the least common DTPs identified by pharmacist reviewers in most years.

Drug therapy problem (DTPs) in the reporting period

Of the 1,788 patients selected for review using all selection methods during the current reporting period, 1,466 patients (82.0%) were deemed by the reviewing pharmacist to have DTPs significant enough to warrant an intervention letter to the patient's prescriber or prescribers, as shown in Figure 20. A total of 3,435 DTPs were identified using all selection methods during the current reporting period: an average of 2.3 DTPs per patient receiving an intervention. A total of 2,149 letters were sent to prescribers reporting these problems.

Figure 20. Numbers of patients who were reviewed and who received interventions in each month

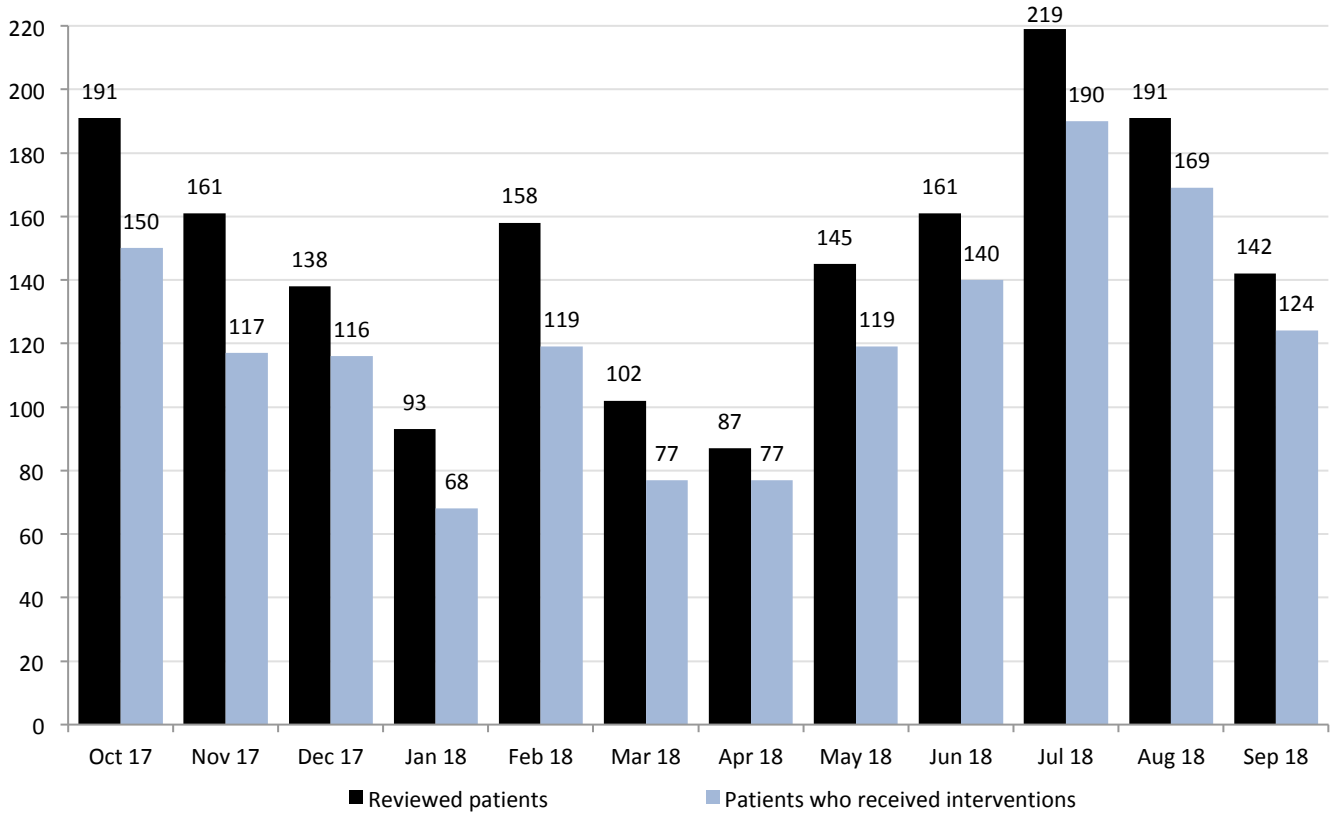


Table 5 details the proportions of patients with significant DTPs in each review cohort, overall and by selection method. In general, patients selected for having a high fill count tended to have a higher average number of DTPs (87.0% overall, range 75.7% to 95.8%). Patients selected for having a variable rule tended to have a lower average number of DTPs (77.9% overall, range 67.4% to 88.9%).

Frequencies of specific DTPs identified by pharmacists between October 2017 and September 2018 are summarized in Figure 21. The most common DTP identified in the current reporting period was *suboptimal adherence*, a pattern of refills indicating that a patient is not adherent to a prescribed regimen intended to treat

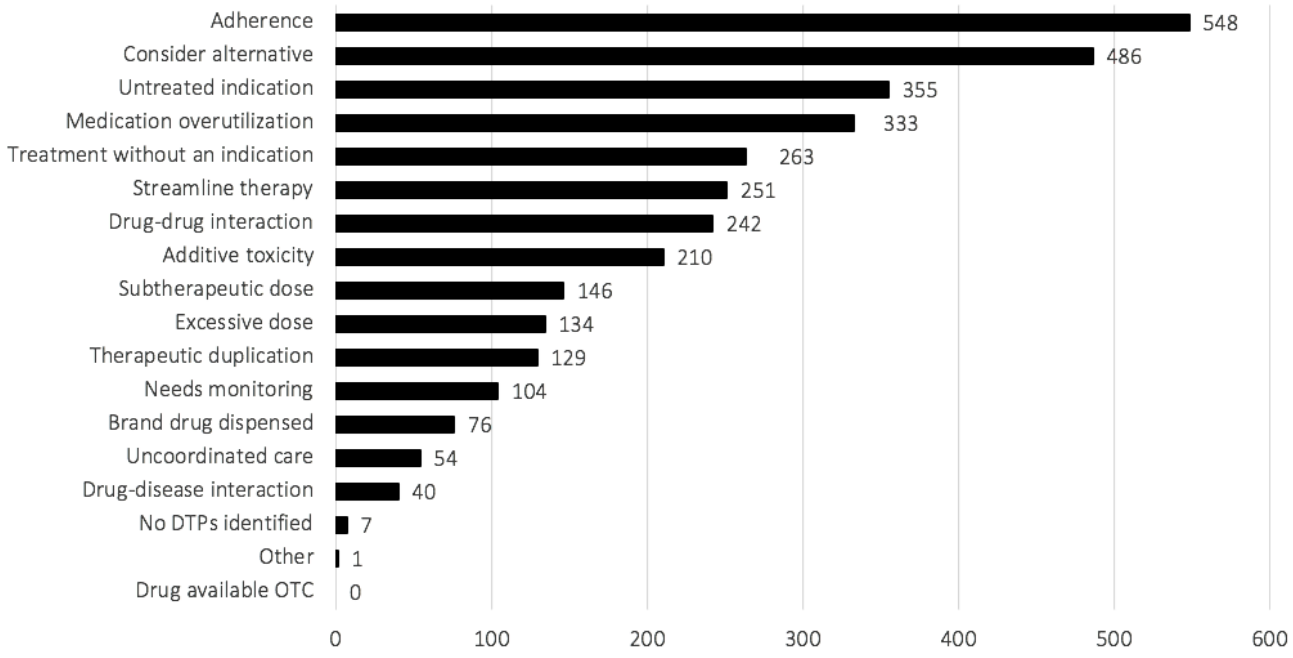
a chronic disease. The most common disease categories for adherence recommendations were cardiovascular drugs (23%), antidepressants (13%), antidiabetic agents (11%), and respiratory drugs (7%).

Table 5. Proportion of patients with significant DTPs in each review cohort, by selection method and overall, October 2017-September 2018

	Overall	17-Oct	17-Nov	17-Dec	18-Jan	18-Feb	18-Mar	18-Apr	18-May	18-Jun	18-Jul	18-Aug	18-Sep
Fill count													
Reviewed	**724**	52	49	55	23	52	37	31	71	72	98	103	81
DTPs	**630**	47	38	47	18	43	28	28	63	69	86	92	71
%	**87.0%**	90.4%	77.6%	85.5%	78.3%	82.7%	75.7%	90.3%	88.7%	95.8%	87.8%	89.3%	87.7%
RxRisk score													
Reviewed	**746**	80	93	63	33	68	47	27	68	73	90	53	51
DTPs	**623**	66	70	50	27	54	38	24	60	63	78	47	46
%	**83.5%**	82.5%	75.3%	79.4%	81.8%	79.4%	80.9%	88.9%	88.2%	86.3%	86.7%	88.7%	90.2%
Variable rule													
Reviewed	**673**	80	51	46	43	56	44	40	56	47	80	76	54
DTPs	**524**	54	36	40	29	38	30	35	41	37	69	67	48
%	**77.9%**	67.5%	70.6%	87.0%	67.4%	67.9%	68.2%	87.5%	73.2%	78.7%	86.3%	88.2%	88.9%

The second most common DTP was *consider alternative*, which typically includes a recommendation about various alternative therapies for consideration in the specific patient. For example, for a patient with fibromyalgia, pharmacists may recommend that prescribers taper the patient off of opioid therapy and initiate an appropriate evidence-based therapy, such as specific antidepressants and/or pregabalin, along with continuing important non-drug therapies.

Figure 21. Frequencies of DTPs identified in the reports sent to prescribers between October 2017 and September 2018

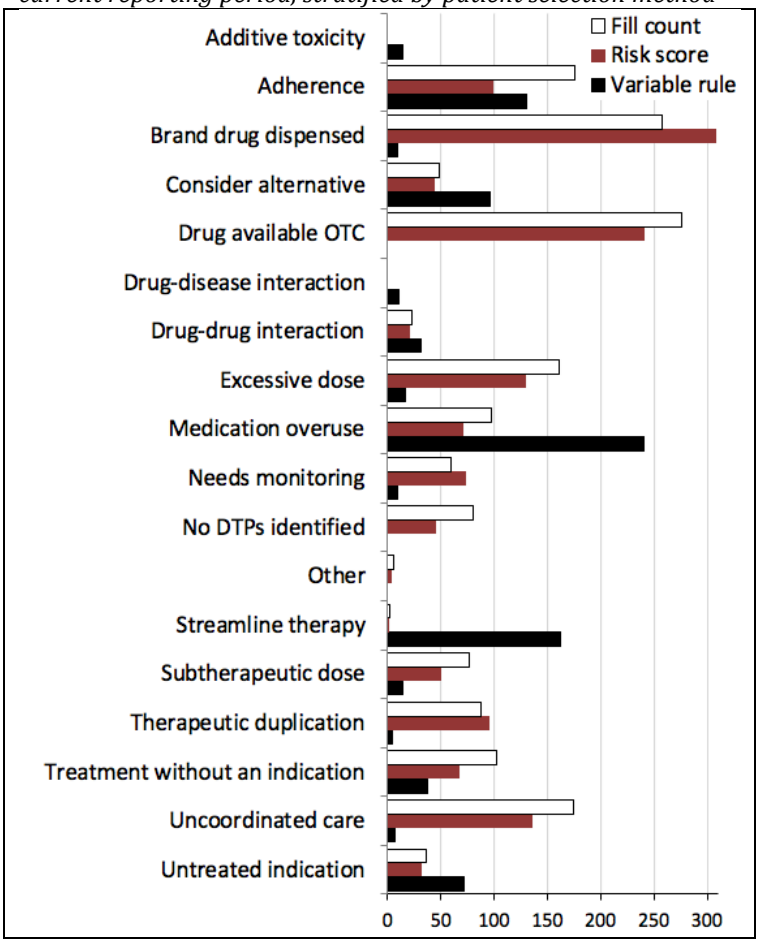


Abbreviations: DTPs – drug therapy problems; OTC – over-the-counter

Figure 22 summarizes the DTPs from the current reporting period, stratified by selection method. In general, several DTP categories tended to be used among patients identified with any selection method. These DTP categories include *adherence*, *drug-drug interactions*, *medication overuse*, *subtherapeutic dose*, *treatment without an indication*, and *untreated indication*. However, some differences are observed with the other DTPs.

Figure 22. Drug therapy problems (DTPs) identified in the

current reporting period, stratified by patient selection method



There was a trend toward some differences in use of a few DTP categories are among patients selected using the variable rules. In addition to the fact that these patients were more likely to be assigned the DTP categories *other* and *variable rule*, as mentioned above, they were also less likely to have recommendations for *brand dispensed*, *drug-disease interaction*, *streamline therapy*, *therapeutic duplication*, and *uncoordinated care*. This may be explained by the fact that the variable rules in the current period did not tend to select for patients with higher utilization. Many of these DTPs are more likely to be observed in patients with large numbers of providers and prescriptions. Variable rule patients were also much less likely to have no DTPs identified by pharmacists, likely because the variable rules were specifically programmed to identify known DTPs and to avoid false positives.

In general, the trends for selection of DTP categories tended to be more similar for patients selected because they had a high fill count compared to those selected for having a high comorbidity score, in contrast to the comparison between the DTPs identified by both of those selection methods compared to the variable rule selection method.

Results for Program Evaluation

Feedback from Providers

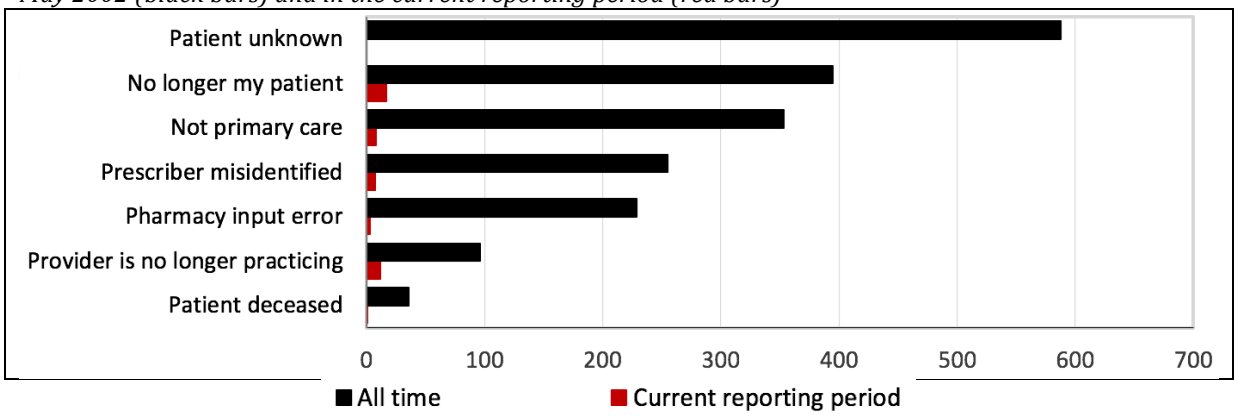
Logistical Feedback

Providers who have been sent an intervention letter may give feedback to the DRRC about one of the logistical issues (i.e., patient unknown, patient deceased, patient no longer with prescriber, prescriber misidentified, prescriber no longer practicing, not primary care, pharmacy input error). When the DRRC began operating in May 2002, administrative efforts were focused primarily on soliciting logistical feedback from the prescribers we contacted. Information was collected regarding incorrectly identified patients and drugs, prescriber changes of practice, pharmacy input errors, incorrect addresses on file, and patients not being treated by the prescriber identified.

Figure 23 summarizes the responses of the 1,952 individuals who have contacted the DRRC about one of these logistical issues after receiving an intervention letter since the program's inception in May 2002 (gray bars) and in the reporting period (blue bars). The number of such reports received in the current reporting year is 48.

Using this feedback, the DRRC implemented a variety of verification procedures, made necessary adjustments to patient selection and prescriber identification processes, and began compiling a proprietary database of personally verified information on doctors who prescribe drugs to Utah Medicaid patients. This proprietary database now contains accurate contact, practice, background, and prescribing information for several thousand Utah prescribers.

Figure 23. Summary of logistical feedback received from prescribers since the inception of the program in May 2002 (black bars) and in the current reporting period (red bars)



Quality Feedback

The average ratings received since October 2009 of two feedback solicitations included with every DRRC recommendation are as follows:

- On the general usefulness of pharmacist recommendations, on a scale of 1-5, with 5 indicating high usefulness: **4.1**.
- On the likelihood of implementation into the patient's existing drug regimen, on a scale of 1-5, with 5 indicating high likelihood: **3.1**.

Table 6 contains a sample of the prescriber comments that have been received by the DRRC in the past.

Table 6. Sample of prescriber comments submitted with quality feedback ratings since the inception of the program

- *"Appreciate notes and education."*
- *"Good information for monitoring the patient."*
- *"I appreciate the information."*
- *"I have encouraged this many times, will do again."*
- *"I will discuss with patient and monitor closely."*
- *"I'll try to remember this next time she has an infection. Thanks!"*
- *"Thanks for the information!"*
- *"Very useful. Very likely to implement this."*
- *"Discussed with patient."*
- *"Have followed recommendation."*
- *"I appreciate the reminder."*
- *"I will discuss with mom and patient when they come to clinic."*
- *"I will no longer prescribe controlled substances for her."*
- *"Patient counseled to talk with other providers and discontinue benzos."*
- *"Useful as a reminder for patients not presenting often."*
- *"Will decrease dosage gradually."*

Qualitative Effectiveness Summary

One of the DRRC's primary missions is to work with individual prescribers to ensure the safest, highest-quality pharmacotherapy for Medicaid patients at the lowest cost possible. As the review process has matured, we have increased the level of interaction with individual prescribers regarding their patients' DTPs. As a result, we have more information on the impact of our reviews.

The following patient profiles are indicative of the types of patients being reviewed and the outcomes of those reviews:

Patient 1

A 29-year-old female, selected for review with the antibiotic use variable rule, filled prescriptions for 15 courses of antibiotics prescribed by 4 different providers during 2017. Antibiotic prescriptions included amoxicillin (5 times), azithromycin (6 times), cefdinir (3 times) and ceftriaxone (once). Diagnosis (ICD-10) or procedure coding (CPT) was found for 6 courses of antibiotics, included pansinusitis (3 times), otitis media (2 times), extraction of an erupted tooth (once), and Strep. pharyngitis (once).

Recommendations included a review of Centers for Disease Control (CDC) antibiotic use recommendations for community-acquired infections in community practice (2017),[10] specialty guidelines from the American Academy of Otolaryngology-Head and Neck Surgery,[11,12] and expert recommendations (i.e., UpToDate)[13] for treatment of her conditions. Suggestions were offered for each diagnosis, which included watchful waiting, saline nasal lavage; a nasal glucocorticoid; analgesics; a 3-month trial of anti-leukotriene therapy; confirmation of diagnosis with rhinoscopy, nasal endoscopy, or computerized tomography; and consideration of allergy and immune function assessment.

In the 7 months since the DRRC's report was submitted to her providers, antibiotic utilization appears to have decreased; there have been only 2 courses of antibiotics filled. These included a 5-day course of azithromycin for acute suppurative otitis media without rupture, and a course of amoxicillin following extraction of an erupted tooth. Other recommendations do not yet appear to have been implemented.

Patient 2

A 56-year-old female was selected for review because of high prescription utilization, with a fill count of 16 prescriptions in the month of review. During the month of review, the patient had averaged 270 morphine milliequivalent daily. Over the most recent 6 months, the patient had filled the following:

- *16 opioid prescriptions for oxycodone/acetaminophen and extended-release morphine, prescribed by 7 different prescribers;*
- *3 prescriptions for naloxone (2 nasal and 1 injection); and*
- *prescriptions for gabapentin (2700 mg daily), prescribed by multiple providers.*

Recommendations included requests for all providers to work to coordinate the patient's care, to try to limit the patient to a single opioid prescriber, to consider the use of an opioid-use agreement with the patient, to consider whether hyperalgesia might play a role in the high opioid-use requirements, to evaluate gabapentin use as it has the potential for abuse, and to determine whether a bowel regimen for constipation was indicated.

At follow-up, Medicaid eligibility had not lapsed. While it took a few months for changes to be implemented following the provider letter, the patient no longer fills prescriptions for any opioid therapy via Utah Medicaid.

Patient 3

A 46-year-old female was selected for review because of high prescription utilization, with a fill count of 12 prescriptions in the month of review. The patient had been filling prescriptions intermittently for linaclotide (3 times over the last 6 months at a monthly cost of more than $380). Diagnosis codes included pain diagnoses, fibromyalgia, chronic idiopathic constipation, and ileus. Additional prescriptions included oxycodone/ acetaminophen and cyclobenzaprine.

Recommendations included discontinuation of linaclotide because it was not being taken regularly, as per "Optimizing the Use of Linaclotide in Patients with Constipation-Predominant Irritable Bowel Syndrome: An Expert Consensus Report",[14] initiating a bowel regimen with stimulant or osmotic laxative; advising adherence to her medication regimen; and confirming use of the lowest effective dosages of opioid and cyclobenzaprine prescriptions.

A recommendation was also made to lower the dose of cyclobenzaprine (a medication associated with anticholinergic adverse effects, including constipation), as the lower dose (5 mg) was considered to have equivalent efficacy to the prescribed higher dose (10 mg). The higher dose may cause more constipation, and the only advantage over the lower dose is a more rapid onset of action.[15]

At follow-up 7 months later, linaclotide had been discontinued, although a prescription bowel regimen had not been added.

Quantitative Effectiveness Summary

Changes in Numbers of Prescriptions Filled

We compared the average number of prescription fills per patient per month in the month of review to the average number of prescriptions per month filled in the last month of the reporting period (September 2018) among patients who still qualified for Medicaid in that month, summarized in Figure 24. Overall, the average number of prescriptions per month declined from 8.2 in the month of review to 6.5 in September 2018, a 21.5% decrease.

Figure 24. Average number of prescription fills per patient, overall and by selection method, compared to the average number of prescriptions filled per patient at the end of the current reporting period

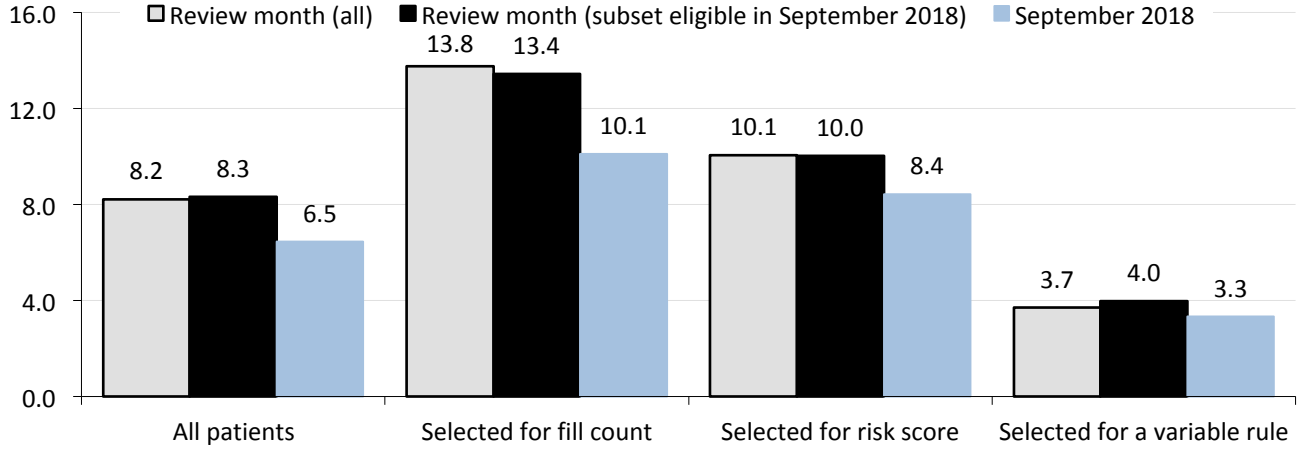


Figure 25 shows these comparisons by month (a) among all patients and (b) among patients selected for review on the basis of high fill count. The per-month decrease for all patients ranged from a 12.5% decrease (from December 2017 to September 2018) to a 36.0% decrease (from November 2017 to September 2018). Among patients selected on the basis of fill count, the change ranged from a 13.5% decrease (May 2018 to September 2018) to a 56.8% decrease (April 2018 to September 2018).

Figure 25. Average number of prescription fills per patient each month, compared to the average number of prescriptions filled per patient by those same patients at the end of the current reporting period in September 2018 for (a) all reviewed patients and (b) patients selected on the basis of prescription refills.

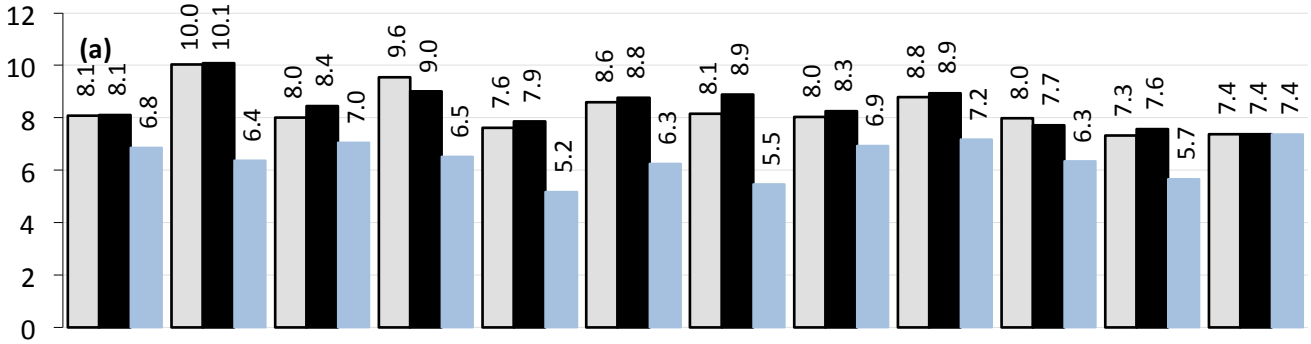
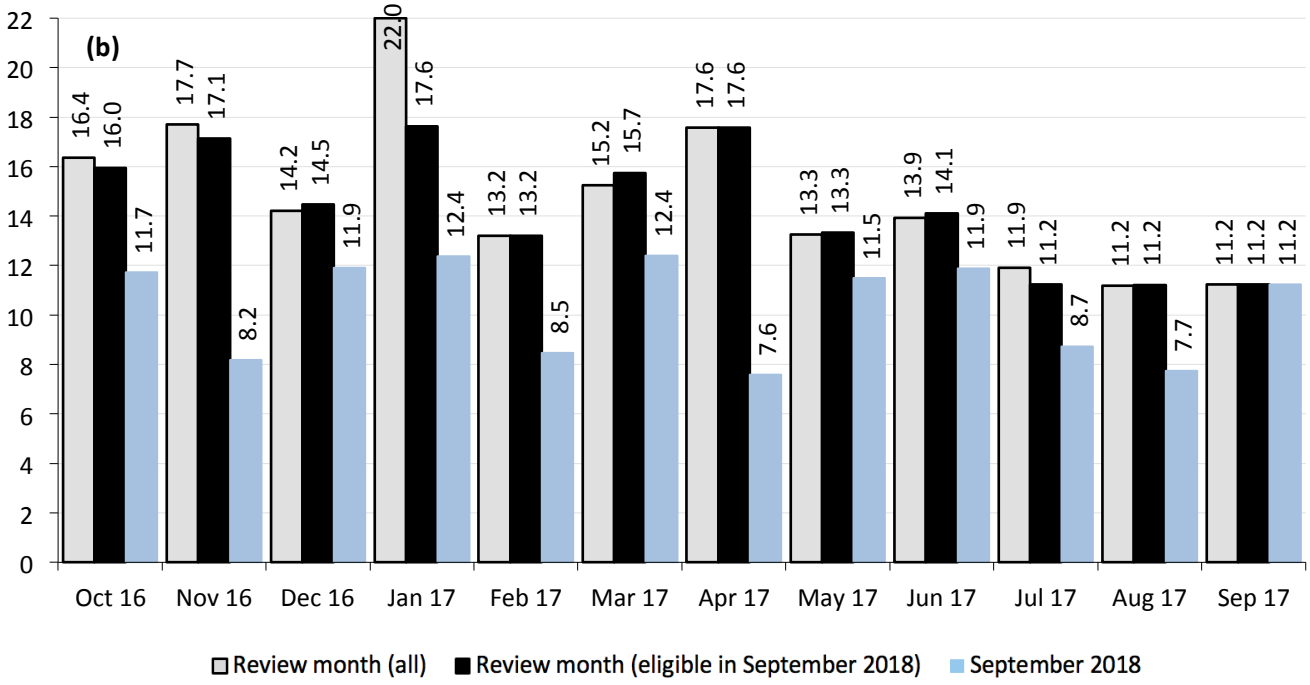


Figure 25. Average number of prescription fills per patient each month, compared to the average number of prescriptions filled per patient by those same patients at the end of the current reporting period in September 2018 for (a) all reviewed patients and (b) patients selected on the basis of prescription refills.



These numbers were also compared by selection method, shown in Figure 24, above. The average number of prescriptions decreased by 26.6% among patients selected for high utilization, by 16.2% for patients selected on the basis of a high comorbidity score, and by 10.0% among patients selected using the variable rules.

Change in RxRisk Scores

We also compared the average comorbidity score per patient in the month of review to the average score in the last month of the reporting period (September 2018) among patients who still qualified for Medicaid in that month, summarized in Figure 26. Overall, the average comorbidity score decreased from 7.5 in the month of review to 7.4 in September 2018, a 1.3% decrease.

Figure 26. Average RxRisk score per patient, by selection method, for all reviews done October 2017-September 2018 compared to the average RxRisk score per patient at the end of the current reporting period in September 2018.

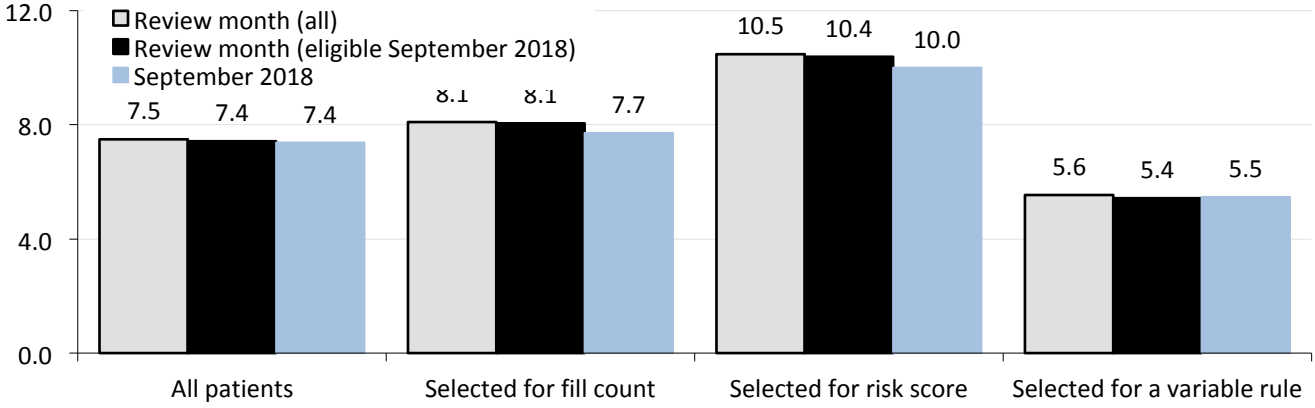
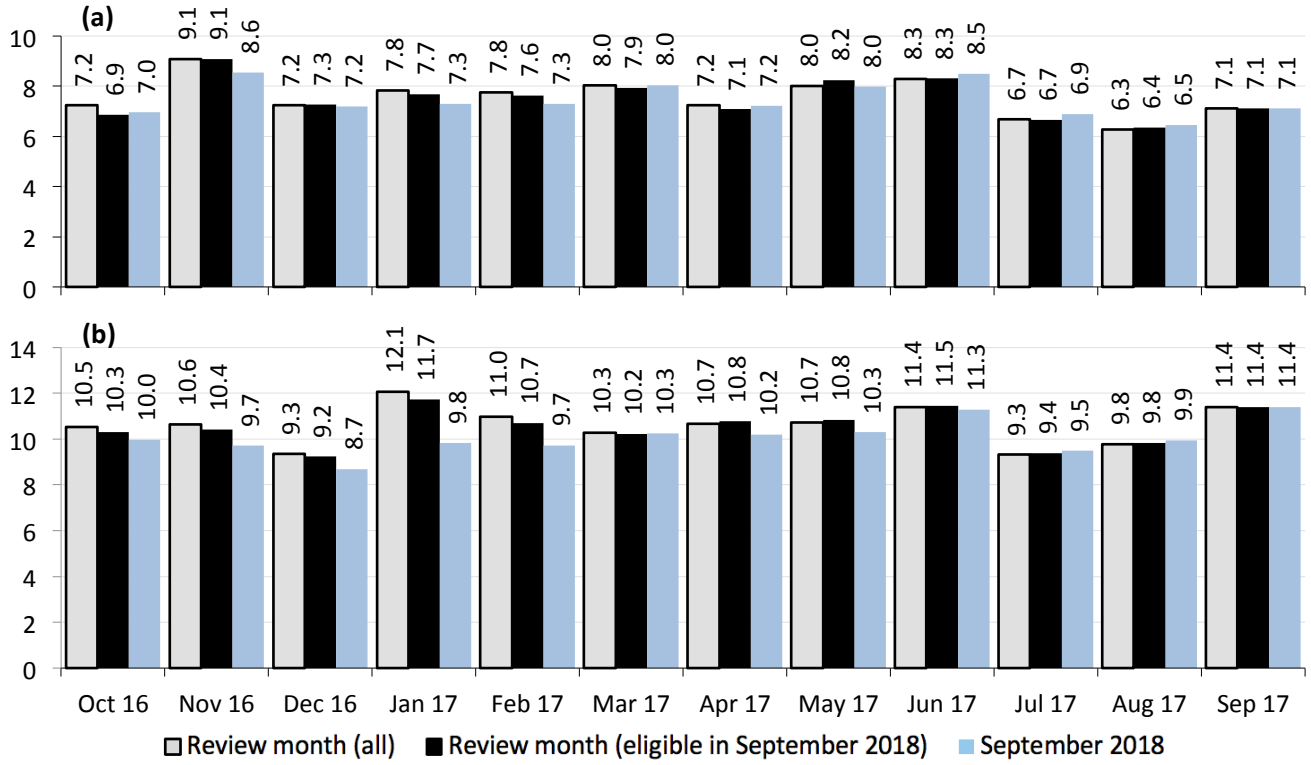


Figure 27 shows these comparisons by month of selection (a) among all patients and (b) among patients selected on the basis of comorbidity score. For all patients, the change in score ranged from the biggest decrease of 6.7% (from January 2018 to September 2018 and February 2018 to September 2018) to the biggest increase of 3.2% (from July 2018 to September 2018). Among patients selected on the basis of comorbidity

score, the change ranged from the largest decrease of 19.0% (from January 2018 to September 2018) to a small increase of 1.0% (from August to September 2018).

Figure 27. Average RxRisk score per patient each month, compared to the average RxRisk score per patient by those same patients at the end of the current reporting period in September 2018 for (a) all reviewed patients and (b) patients selected on the basis of RxRisk score.



These numbers were also compared by selection method, shown in Figure 26, above. The average risk score per patient decreased by 4.8% among patients selected on the basis of the risk score, by 4.9% among patients selected for high fill count, and by 1.8% among patients selected on the basis of the variable rule.

Change in drug therapy problems (DTPs)

As stated previously, patients who are selected for review on the basis of one of the variable rules shown in Table 1 are reevaluated after 6 months to determine if they would still meet the requirements for selection as a measure of the effectiveness of our intervention. Table 7 shows the numbers of patients reviewed for targeted interventions whose 6-month follow-up occurred in the current reporting period (October 2017-September 2018), as well as the numbers that were still Medicaid-eligible during that 6-month follow-up period and the numbers who continued to meet the criteria for the targeted intervention at the 6-month follow-up.

On average, the proportions of patients who still had the identified DTP in the follow up month diminished by a monthly average of 82.6% (range 59.6% to 100.0%). These reductions were explained by a combination of (A) a reduction in the numbers of patients still Medicaid-eligible at 6 months (50.3%) as well as (B) a reduction in the numbers of patients who had the DTP among those who continued to have benefits (78.3%).

Change in Cost

The DRRC does not review costs as one of its primary services to Utah Medicaid. However, cost is affected indirectly by the services provided by the DRRC, so it is evaluated as one measure of program success in this report. Other measures of success include changes in utilization and changes in numbers of patients who meet eligibility for specific DTPs (both described previously), as well as direct measures of patient health, which are not described.

Drug Cost Savings of Reviewed Medicaid Patients

Table 7. Targeted intervention rule six-month follow-up results, October 2017-September 2018

Original review		Follow-up review					
Review month	Number with DRP	Follow-up month	Number (%) still eligible at 6-month follow-up		Number (%) reduction out of eligible subset		Percentage reduction overall
			N	(%)	N	(%)	
Apr-17	47	Oct-17	41	(12.8)	19	(53.7)	59.6
May-17	33	Nov-17	31	(6.1)	2	(93.5)	93.9
Jun-17	49	Dec-17	39	(20.4)	11	(71.8)	77.6
Jul-17	138	Jan-18	121	(12.3)	37	(69.4)	73.2
Aug-17	65	Feb-18	59	(9.2)	0	(100.0)	100.0
Sep-17	28	Mar-18	24	(14.3)	0	(100.0)	100.0
Oct-17	80	Apr-18	72	(10.0)	20	(72.2)	75.0
Nov-17	51	May-18	45	(11.8)	10	(77.8)	80.4
Dec-17	46	Jun-18	44	(4.3)	10	(77.3)	78.3
Jan-18	43	Jul-18	37	(14.0)	7	(81.1)	83.7
Feb-18	56	Aug-18	52	(7.1)	8	(84.6)	85.7
Mar-18	44	Sep-18	38	(13.6)	7	(81.6)	84.1
Average	*56.7*	*Any*	*50.3*	*(11.3)*	*10.9*	*(78.3)*	*82.6*

Estimated drug cost expenditures among the monthly cohorts of reviewed patients that have accrued by the end of the reporting period, overall and stratified by selection method, are available in Appendix A. Overall savings that had accrued for the cohorts of reviewed patients by September 2018 was $923,155 (Table 8). In a comparison of expenditures in each review month with those at the end of the current reporting period, most total and average expenditures trended downward by a range of 4.7% (for patients reviewed in August 2018) to 27.5% (for patients reviewed in February 2018). However, in the April cohort, the average expenditure increased slightly, by 2.1%. Generally, changes in expenditures over time have great variability, particularly when analyzed via selection method. It is important to note that the savings tend to be higher in the earlier periods than in the later periods, primarily because the savings have not yet had time to accrue in the recently reviewed cohorts. (For example, the savings for the November 2017 cohort are the largest at $255,646, in large part because the savings have accrued for 10 months, while the savings for the August 2018 are the smallest (at $10,275), largely because they have only accrued for 1 month.) Consequently, if these patient cohorts were followed beyond the reporting period, we anticipate that the estimated savings would be much more than the $923,155 amount shown.

Table 8. Summary of drug cost savings in reviewed patients.

Selected by fill count	$532,906
Selected by RxRisk score	$578,824
Selected by variable rule	$141,100
TOTAL	**$923,155**

Numbers reported include all patients who flagged for each eligibility criterion. Some patients may have flagged for more than 1 criterion.

The amount of savings that had accrued among patients with a high fill count was $532,906, which was 57.7% of the overall projected savings to date. Compared to projected costs, by the end of the reporting period, these patients' drug costs were 12.4% lower than expected. In most monthly cohorts, the actual expenditures were lower than projected: ranging from $17,506 in the May 2018 cohort to $150,548 in the October 2017 cohort. In 3 of the monthly cohorts the actual expenditures were higher than projected: February, April, and June 2018 (by $30,416, $14,911, and $9,968, respectively). Recommendations for these patients are expected to be more likely for cost-related problems such as therapeutic duplication and availability of cheaper alternatives.

The largest portion of the estimated savings accrued among patients who met the RxRisk score criterion: 62.7% of total estimated savings that have accrued to-date. By the end of the reporting period, these patients had accrued a total expenditure savings of 13.6%. In most monthly cohorts, the actual expenditures were lower than projected, ranging from $10,243 savings in the June 2018 cohort to $190,465 in the February 2018 cohort. In

only 2 of the monthly cohorts were the actual expenditures higher than projected: in December 2017, by $35,748, and in August 2018, by $1,532. Patients selected for RxRisk score are expected to have DTPs that are more clinical in nature (e.g., potential drug-drug interactions, untreated indications). The primary benefit of this type of intervention tends to be longer-term savings and increased quality of care.

Patients selected with variable rules accrued an estimated total expenditure savings of $141,100, which was 15.3% of the total savings accrued by the end of the reporting period. Among this cohort, the actual expenditures were 15.6% lower than anticipated in the absence of a review by the end of the current reporting period. All monthly cohorts but one accrued savings that ranged from 3.1% in December 2017 to 31.4% in November 2017 of anticipated expenditures. Only the April 2018 cohort accrued a loss, with expenditures that were 29.8% higher than anticipated. As with patients selected for RxRisk score, the primary benefits of this type of intervention are also expected to result from longer-term medical cost offsets and increased quality of care.

Change in Costs for Common Drug Products

Table 9 shows the change in expenditures over the current reporting period for the 10 drug products most commonly prescribed to DRRC-reviewed patients. Over the course of the current reporting period, there was one (1) double-digit increase, three (3) single-digit increases, and six (6) single-digit decreases in the average reimbursement amounts. It is possible that preferred drug lists and underlying market factors affect the total savings seen over the course of the reporting period, though further analysis would be needed to confirm this. Manufacturer rebates are not considered in this analysis.

Limitations

There are limitations to what these cost data can yield. Because we eliminated patients who did not receive subsequent prescriptions, and because we only followed patients until the end of the reporting period, these cost estimates are conservative. We cannot determine what the reviewed patients' drug costs would have been if they had not been reviewed, and cannot compare projected drug costs to actual expenditures for the future. To effectively address this we would need to compare changes in prescription drug costs over the same period with a suitable control group. This is not possible with our current patient selection process.

Table 9. Average change in cost reimbursement over the current reporting period for the 10 drug products most commonly prescribed to DRRC-reviewed patients.

Generic	Product	Average expenditures 10/2017	Average expenditures 09/2018	% change
Gabapentin	GABAPENTIN CAP 300MG	$19.07	$15.83	-20.46%
Clonazepam	CLONAZEPAM TAB 1MG	$10.42	$10.56	1.39%
Gabapentin	GABAPENTIN TAB 600MG	$27.10	$28.22	3.95%
Insulin Glargine	LANTUS INJ 100/ML	$372.54	$385.95	3.48%
Loratadine	LORATADINE TAB 10MG	$10.86	$11.62	6.50%
Duloxetine HCl	DULOXETINE CAP 60MG	$19.76	$18.38	-7.54%
Atorvastatin Calcium	ATORVASTATIN TAB 40MG	$14.88	$12.80	-16.26%
Fluticasone Propionate (Nasal)	FLUTICASONE SPR 50MCG	$17.81	$15.64	-13.85%
Baclofen	BACLOFEN TAB 10MG	$21.49	$20.03	-7.29%
Metformin HCl	METFORMIN TAB 1000MG	$19.87	$19.52	-1.79%

Substance Use-Disorder Prevention that Promotes Opioid Recovery and Treatment (SUPPORT) for Patients and Communities Act

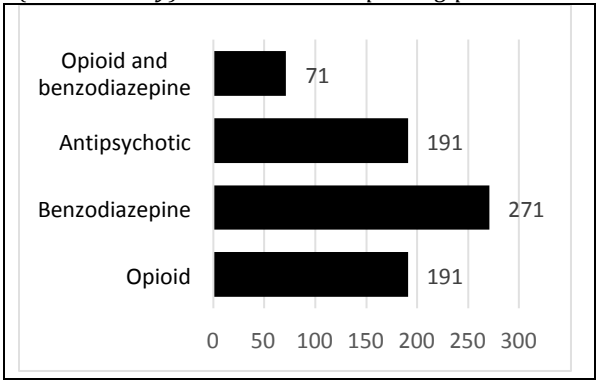
In 2018, Congress passed the SUPPORT Act in an effort to secure funding and flexibility for the states' Medicaid programs to address controlled substance abuses, including opioids and benzodiazepines. The main provisions of this Act center on medication-assisted treatment. Of special pertinence to the Utah Medicaid DUR are the Act's provisions requiring DUR boards to address pediatric antipsychotic use (Sec. 1004.a.B) as follows:[16]

> Program to Monitor Antipsychotic Medications by Children—The State has in place a program (as designed and implemented by the State) to monitor and manage the appropriate use of antipsychotic medications by children enrolled under the State plan (or under a waiver of the State plan) and submits annually to the Secretary such information as the Secretary may require on activities carried out under such program for individuals not more than the age of 18 years generally and children in foster care specifically.[16]

The directive to submit an annual report to the Secretary on the "limitations, requirement, program, and processes applied by the State" regarding this and other SUPPORT Act provisions concerning DUR boards shall be determined in cooperation between the State of Utah and Utah Medicaid. Although this requirement is not yet active, we examined our activities in the current year to determine if any patient-level interventions were made that addressed pediatric utilization of antipsychotics.

Meanwhile, we provide a summary of the number of DTPs that were addressed in the current reporting period that addressed the following: opioids, benzodiazepines, antipsychotics, opioids *and* benzodiazepines (in the same DTP), or any of these. For antipsychotics, we summarize this information overall and for pediatrics ages 18 and younger separately. These are summarized in Figure 28 and Table 10. A total of 653 patients had DTPs that addressed drugs in one or more of these categories. Of those, only 12 (1.8%) were in a patient age 18 or younger.

Figure 28. Numbers of patients with DTPs that concerned antipsychotics, benzodiazepines, opioids, or benzodiazepines/opioids (concurrently) in the current reporting period



Abbreviations: DTPs – drug therapy problems

Table 10. Numbers of patients ages ≤18 with DTPs that concerned antipsychotics among patients ages 18 or younger between October 2017 and September 2018

DTP Category	Frequency (%)
Additive toxicity	1 (7.7)
Brand dispensed	1 (7.7)
Drug-disease interaction	1 (7.7)
Streamline therapy	1 (7.7)
Treatment without an indication	1 (7.7)
Adherence	5 (38.5)
Needs monitoring	2 (15.4)

Abbreviations: DTPs – drug therapy problems

In ongoing work, we will be developing methods to track recommendations that relate to provisions of the SUPPORT law.

Section 1 Summary

Patients selected for review are served by the missions of the DRRC in material ways: they frequently have adjustments made to their drug regimens that either result in improved care, lower expenditures, or both. Additionally, physicians receiving the recommendations of the DRRC are served with a comprehensive portrait of patients' regimens and are offered options for improved care and lowered cost.

SECTION 2: DUR BOARD REVIEWS

Drug Utilization Review (DUR) Board presentations focus on the role of selected agents among other treatments, and on the utilization of these agents in the Utah Medicaid population to ensure appropriate and medically necessary use while considering potential safety, abuse and misuse issues.

Methods

How Topics are Selected

DRRC members and Medicaid pharmacy team members meet quarterly to collaboratively plan and update future DUR topics. The proposed topics are presented to the Utah Medicaid Bureau Director for approval. Indications for DUR review include safety considerations, appropriate use, quantity limitations, and other areas of concern.

Assembling the Hierarchy of Evidence (HOE)

We perform a literature review according to a hierarchy of evidence (HOE) strategy. Depending on the type of evidence needed and available, common search locales include Medline (PubMed); the US Food and Drug Administration (FDA) website (including product labeling information); Lexicomp; World Health Organization; national associations governing research and treatment of the disease state; and other drug databases. Reference lists from search results are screened for additional relevant publications.

For each report a utilization strategy is developed in order to identify usage patterns of the medication(s) being reviewed. Utah Medicaid utilization data are extracted using Utah Medicaid classification (0812*) and are included in the reports. Other data centers such as the Centers for Disease Control and prevention (CDC), Agency for Healthcare Research and Quality (AHRQ), Public Health Indicator Based Information System (IBIS) Utah's Public Health Data Resource,[17] the FDA website, Micromedex, Lexicomp, UpToDate, Pharmacist's letter, Cochrane Library and PubMed may also be searched for specific information to help inform the drug utilization extraction.

Disseminating the Reviews

Approximately 1-2 weeks before the DUR meeting date, reviews are submitted to the Board and published to the publicly accessible Medicaid website (https://medicaid.utah.gov/pharmacy/drug-utilization-review-board). Decisions of the DUR board are published in the agenda and minutes of the subsequent meeting in the following month.

Results

During the reporting period of October 2017-September 2018, 9 topics were addressed over a total of 9 presentations. From the beginning of the current contract through September 2018, 39 topics were addressed over a total of 43 presentations. Table 11 summarizes the research done for DUR Board presentations between October 2017 and September 2018.

Table 11. Drug Utilization Review (DUR) Board presentations produced by the DRRC, October 2017-September 2018

Date of Presentation	Topic of Presentation
10/12/17	Pediatric antibiotic overuse
11/09/17	Antibiotic follow-up data
12/14/17	Orphan drugs
01/11/18	Botulinum toxins for spasticity in children
02/08/18	Intrathecal baclofen
03/08/18	Orphan drugs continued, and Spinraza
04/12/18	Synagis, on and off label uses (use >2 yrs old)
06/14/18	Luxturna
07/12/18	Buprenorphine depot injection

Limitations and Comments

The greatest limitations to reports of this kind are the constraints on scope and time. Because such reports are produced monthly, not all topics receive exhaustive review. Scope is limited by necessity but also needs to cover enough of the topic requested by the DUR board to actionably inform their decisions regarding Utah Medicaid.

SECTION 3: P&T COMMITTEE REVIEWS

Pharmacy and Therapeutics (P&T) Committee reports consist of a class review, utilization data and list of available agents and dosage forms.

Methods

How Topics are Selected

DRRC members and Medicaid pharmacy team members meet quarterly to collaboratively plan and update future P&T topics. The proposed topics are presented to the Utah Medicaid Bureau Director for approval. Indications for P&T review include new drugs, new drug classes, and re-review of previously presented topics in order to assess the safety and efficacy of the medications.

Assembling the Reviews

For each approved topic, a research librarian develops a search strategy and performs a systematic literature review to be used by the DRRC and Utah Medicaid to define the scope of the report. Two methodological filters are used, one for systematic reviews/meta-analyses (SR/MAs) and another for randomized controlled trials (RCTs). Results are limited to English language. Databases are searched from 2010 to present for SR/MAs and from 2015 to present for RCTs. We also screen the reference lists of related systematic reviews and other relevant websites for further information. At least two review authors screen titles and abstracts. Conflicts are resolved via discussion between reviewers or a third person. The full texts for all citations receiving two inclusion votes are retrieved and reviewed. Evidence is selected according to the HOE by the lead author. High quality SR/MAs may be sufficient to answer the questions of comparable safety and efficacy, but when necessary, evidence to the level of direct RCT comparisons are included. In these cases, SR/MAs of RCTs and RCTs providing direct head-to-head efficacy and/or safety comparisons are prioritized.

Disseminating the Reviews

Reviews are submitted to the P&T committee approximately 2 weeks before meeting dates and published to the Medicaid website (https://medicaid.utah.gov/pharmacy/pt-committee) for the public.

Results

During the reporting period of October 2017-September 2018, 11 topics were addressed over a total of 10 presentations. From the beginning of the current contract through September 2018, 33 topics were addressed over a total of 21 presentations. Table 12 summarizes the research done for P&T Committee reports between October 2017 and September 2018.

Table 12. Pharmacy and Therapeutics (P&T) Committee presentations produced by the DRRC, October 2017-September 2018

Date of Presentation	Topic of Presentation
10/19/17	Chronic obstructive pulmonary disorder (COPD) and asthma: Long-acting Beta-2 agonist and glucocorticoid combinations
11/16/17	Dipeptidyl peptidase-4 inhibitor (DPP-4i) containing products
01/18/18	Antiplatelet inhibitors
02/15/18	Intranasal corticosteroids
03/15/18	Movement disorders
04/19/18	Nonsteroidal anti-inflammatory drugs (NSAIDs)
05/17/18	Proton-pump inhibitors (PPIs)
06/20/18	HMG CoA reductase inhibitors (statins)
07/19/18	Hemophilia A (Factor VIII)
09/20/18	Hemophilia B (Factor IX)
09/20/18	Hemophilia B Factor VIII/von Willebrand factor (VWF) combination replacement products

Committee Decisions

Decisions of the P&T committee are published in the agenda and minutes of the subsequent meeting in the following month. Medications shown to be equally safe and effective are then considered for inclusion on the Utah Medicaid Preferred Drug List.

Limitations

The greatest limitations to reports of this kind are the constraints on scope and time. Because such reports are produced monthly, not all topics receive exhaustive review. Scope is limited by necessity but also needs to cover enough of the topic requested by the P&T committee to actionably inform their decisions regarding the Preferred Drug Lists.

CONCLUSIONS

As in most years, this year the DRRC helped to mitigate increasing drug costs that have trended upward since 2006, as well as to improve care both to specific patients and to cohorts of patients identified by disease state. Drug costs among all patients decreased very slightly during the current reporting period, from $17,845,986 to $17,834,153 per month (<0.1% change).

The DRRC also continued to fulfill the need for review of key quality and safety indicators in the prescribing of the Utah Medicaid health system. Pharmacist reviews of therapy for Medicaid patients have improved the quality of their drug regimens, as well as clinical and economic endpoints. Congruent with the review of patients at the microscopic level, the DRRC has also produced numerous macroscopic recommendations for the Medicaid Preferred Drug List (PDL) and current criteria review documents for the DUR and P&T.

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APPENDIX A

Appendix A1. Total and average reimbursement for all reviewed patients fitting inclusion criteria

Review month (RM)	# patients	17-Oct		17-Nov		17-Dec		18-Jan		18-Feb		18-Mar		18-Apr		18-May		18-Jun		18-Jul		18-Aug		18-Sep		Actual total	Projected total	Savings	
		$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM			$	%
Total reimbursement																													
17-Oct	146	$126,233	n/a	$106,542	84.4%	$113,619	90.0%	$105,149	83.3%	$103,877	82.3%	$118,883	94.2%	$118,312	93.7%	$131,398	104.1%	$115,842	91.8%	$123,291	97.7%	$124,394	98.5%	$104,498	82.8%	$1,392,046	$1,514,794	$122,748	8.1%
17-Nov	125	.		$123,649	n/a	$98,888	80.0%	$109,403	88.5%	$88,355	71.5%	$94,234	76.2%	$95,171	77.0%	$101,895	82.4%	$113,631	91.9%	$105,859	85.6%	$92,378	74.7%	$81,025	65.5%	$1,104,494	$1,360,141	$255,646	18.8%
17-Dec	119	.		.		$113,386	n/a	$111,923	98.7%	$88,133	77.7%	$107,105	94.5%	$91,704	80.9%	$115,131	101.5%	$97,728	86.2%	$100,412	88.6%	$96,945	85.5%	$95,976	84.6%	$1,018,452	$1,133,856	$115,404	10.2%
18-Jan	68	.		.		.		$55,174	n/a	$51,397	93.2%	$49,423	89.6%	$52,287	94.8%	$42,813	77.6%	$35,108	63.6%	$44,624	80.9%	$39,105	70.9%	$40,013	72.5%	$409,951	$496,568	$86,617	17.4%
18-Feb	122	.		.		.		.		$93,675	n/a	$63,090	67.3%	$65,584	70.0%	$65,406	69.8%	$44,955	48.0%	$82,124	87.7%	$79,921	85.3%	$48,556	51.8%	$543,313	$749,398	$206,085	27.5%
18-Mar	74	.		.		.		.		.		$53,010	n/a	$48,401	91.3%	$47,333	89.3%	$45,452	85.7%	$43,993	83.0%	$42,471	80.1%	$44,484	83.9%	$325,148	$371,067	$45,919	12.4%
18-Apr	64	.		.		.		.		.		.		$38,590	n/a	$38,400	99.5%	$39,650	102.7%	$39,891	103.4%	$40,242	104.3%	$39,730	103.0%	$236,507	$231,541	($4,966)	-2.1%
18-May	93	.		.		.		.		.		.		.		$71,238	n/a	$65,762	92.3%	$70,940	99.6%	$59,731	83.8%	$66,963	94.0%	$334,637	$356,192	$21,554	6.1%
18-Jun	115	.		.		.		.		.		.		.		.		$94,059	n/a	$83,592	88.9%	$92,687	98.5%	$86,510	92.0%	$356,850	$376,236	$19,386	5.2%
18-Jul	166	.		.		.		.		.		.		.		.		.		$152,160	n/a	$143,542	94.3%	$116,290	76.4%	$411,992	$456,479	$44,486	9.7%
18-Aug	129	.		.		.		.		.		.		.		.		.		.		$109,063	n/a	$98,788	90.6%	$207,850	$218,126	$10,275	4.7%
18-Sep	108	.		.		.		.		.		.		.		.		.		.		.		$87,029	n/a				
TOTAL																								TOTAL		$6,341,241	$7,264,396	$923,155	12.7%
Average reimbursement per patient																													
17-Oct	146	$864.61	n/a	$852.33	98.6%	$954.79	110.4%	$1,546.31	178.8%	$851.45	98.5%	$1,606.52	185.8%	$1,848.62	213.8%	$1,412.88	163.4%	$1,007.33	116.5%	$742.71	85.9%	$964.29	111.5%	$967.57	111.9%	$13,633	$10,375	($3,258)	-31.4%
17-Nov	125	.		$989.19	n/a	$830.99	84.0%	$1,608.86	162.6%	$724.22	73.2%	$1,273.43	128.7%	$1,487.04	150.3%	$1,095.64	110.8%	$988.09	99.9%	$637.71	64.5%	$716.11	72.4%	$750.23	75.8%	$11,111	$10,881	($230)	-2.1%
17-Dec	119	.		.		$952.82	n/a	$1,645.93	172.7%	$722.41	75.8%	$1,447.36	151.9%	$1,432.88	150.4%	$1,237.97	129.9%	$849.81	89.2%	$604.89	63.5%	$751.51	78.9%	$888.67	93.3%	$10,543	$9,528	($1,015)	-10.7%
18-Jan	68	.		.		.		$811.39	n/a	$421.29	51.9%	$667.88	82.3%	$816.98	100.7%	$460.36	56.7%	$305.28	37.6%	$268.82	33.1%	$303.14	37.4%	$370.50	45.7%	$4,430	$7,302	$2,873	39.3%
18-Feb	122	.		.		.		.		$767.83	n/a	$852.56	111.0%	$1,024.74	133.5%	$703.29	91.6%	$390.91	50.9%	$494.72	64.4%	$619.54	80.7%	$449.59	58.6%	$5,309	$6,143	$834	13.6%
18-Mar	74	.		.		.		.		.		$716.35	n/a	$756.27	105.6%	$508.95	71.0%	$395.24	55.2%	$265.02	37.0%	$329.23	46.0%	$411.89	57.5%	$3,386	$5,014	$1,628	32.5%
18-Apr	64	.		.		.		.		.		.		$602.97	n/a	$412.91	68.5%	$344.78	57.2%	$240.31	39.9%	$311.95	51.7%	$367.87	61.0%	$2,283	$3,618	$1,335	36.9%
18-May	93	.		.		.		.		.		.		.		$766.00	n/a	$571.84	74.7%	$427.35	55.8%	$463.03	60.4%	$620.03	80.9%	$2,850	$3,830	$980	25.6%
18-Jun	115	.		.		.		.		.		.		.		.		$817.90	n/a	$503.57	61.6%	$718.50	87.8%	$801.02	97.9%	$2,842	$3,272	$429	13.1%
18-Jul	166	.		.		.		.		.		.		.		.		.		$916.62	n/a	$1,112.73	121.4%	$1,076.76	117.5%	$3,107	$2,750	($357)	-13.0%
18-Aug	129	.		.		.		.		.		.		.		.		.		.		$845.45	n/a	$914.70	108.2%	$1,760	$1,691	($69)	-4.1%
18-Sep	108	.		.		.		.		.		.		.		.		.		.		.		$805.83	n/a				

Appendix A2. Total and average reimbursement for patients selected by fill count and fitting inclusion criteria

Review month (RM)	# patients	17-Oct		17-Nov		17-Dec		18-Jan		18-Feb		18-Mar		18-Apr		18-May		18-Jun		18-Jul		18-Aug		18-Sep		Actual total	Projected total	Savings	
		$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM			$	%
Total reimbursement																													
17-Oct	43	$85,006	n/a	$67,231	79.1%	$58,992	69.4%	$63,833	75.1%	$64,255	75.6%	$71,959	84.7%	$76,749	90.3%	$89,595	105.4%	$74,682	87.9%	$76,538	90.0%	$74,003	87.1%	$66,678	78.4%	$869,523	$1,020,070	$150,548	14.8%
17-Nov	41	.		$52,410	n/a	$40,915	78.1%	$47,828	91.3%	$38,147	72.8%	$44,432	84.8%	$40,312	76.9%	$43,821	83.6%	$42,024	80.2%	$47,229	90.1%	$43,585	83.2%	$33,821	64.5%	$474,524	$576,514	$101,991	17.7%
17-Dec	49	.		.		$73,092	n/a	$66,146	90.5%	$47,106	64.4%	$59,482	81.4%	$54,599	74.7%	$64,716	88.5%	$54,138	74.1%	$58,890	80.6%	$55,060	75.3%	$52,834	72.3%	$586,064	$730,917	$144,853	19.8%
18-Jan	22	.		.		.		$41,867	n/a	$41,235	98.5%	$37,550	89.7%	$40,832	97.5%	$27,233	65.0%	$24,574	58.7%	$28,800	68.8%	$26,973	64.4%	$28,703	68.6%	$297,767	$376,805	$79,038	21.0%
18-Feb	39	.		.		.		.		$30,267	n/a	$37,040	122.4%	$35,010	115.7%	$34,240	113.1%	$20,050	66.2%	$46,044	152.1%	$44,962	148.6%	$24,943	82.4%	$272,555	$242,139	($30,416)	-12.6%
18-Mar	26	.		.		.		.		.		$29,457	n/a	$27,584	93.6%	$26,699	90.6%	$27,132	92.1%	$23,875	81.1%	$26,432	89.7%	$26,605	90.3%	$187,784	$206,201	$18,417	8.9%
18-Apr	27	.		.		.		.		.		.		$30,151	n/a	$31,089	103.1%	$33,239	110.2%	$34,445	114.2%	$32,694	108.4%	$34,200	113.4%	$195,819	$180,908	($14,911)	-8.2%
18-May	50	.		.		.		.		.		.		.		$54,981	n/a	$51,475	93.6%	$55,713	101.3%	$42,764	77.8%	$52,467	95.4%	$257,401	$274,906	$17,506	6.4%
18-Jun	49	.		.		.		.		.		.		.		.		$60,840	n/a	$60,385	99.3%	$68,063	111.9%	$64,041	105.3%	$253,329	$243,361	($9,968)	-4.1%
18-Jul	80	.		.		.		.		.		.		.		.		.		$96,311	n/a	$71,185	73.9%	$68,375	71.0%	$235,871	$288,933	$53,062	18.4%
18-Aug	69	.		.		.		.		.		.		.		.		.		.		$76,326	n/a	$53,540	70.1%	$129,866	$152,653	$22,787	14.9%
18-Sep	64	.		.		.		.		.		.		.		.		.		.		.		$69,560	n/a				
TOTAL																								TOTAL		$3,760,502	$4,293,408	$532,906	12.4%
Average reimbursement per patient																													
17-Oct	43	$1,977	n/a	$1,640	82.9%	$1,204	60.9%	$2,902	146.8%	$1,648	83.3%	$2,768	140.0%	$2,843	143.8%	$1,792	90.6%	$1,524	77.1%	$957	48.4%	$1,073	54.2%	$1,042	52.7%	$21,367	$23,723	$2,356	9.9%
17-Nov	41	.		$1,278	n/a	$835	65.3%	$2,174	170.1%	$978	76.5%	$1,709	133.7%	$1,493	116.8%	$876	68.6%	$858	67.1%	$590	46.2%	$632	49.4%	$528	41.3%	$11,952	$14,061	$2,109	15.0%
17-Dec	49	.		.		$1,492	n/a	$3,007	201.5%	$1,208	81.0%	$2,288	153.3%	$2,022	135.5%	$1,294	86.8%	$1,105	74.1%	$736	49.3%	$798	53.5%	$826	55.3%	$14,775	$14,917	$142	1.0%
18-Jan	22	.		.		.		$1,903	n/a	$1,057	55.6%	$1,444	75.9%	$1,512	79.5%	$545	28.6%	$502	26.4%	$360	18.9%	$391	20.5%	$448	23.6%	$8,162	$17,128	$8,965	52.3%
18-Feb	39	.		.		.		.		$776	n/a	$1,425	183.6%	$1,297	167.1%	$685	88.2%	$409	52.7%	$576	74.2%	$652	84.0%	$390	50.2%	$6,208	$6,209	$0	0.0%
18-Mar	26	.		.		.		.		.		$1,133	n/a	$1,022	90.2%	$534	47.1%	$554	48.9%	$298	26.3%	$383	33.8%	$416	36.7%	$4,340	$7,931	$3,591	45.3%
18-Apr	27	.		.		.		.		.		.		$1,117	n/a	$622	55.7%	$678	60.7%	$431	38.5%	$474	42.4%	$534	47.8%	$3,856	$6,700	$2,845	42.5%
18-May	50	.		.		.		.		.		.		.		$1,100	n/a	$1,051	95.5%	$696	63.3%	$620	56.3%	$820	74.5%	$4,286	$5,498	$1,212	22.0%
18-Jun	49	.		.		.		.		.		.		.		.		$1,242	n/a	$755	60.8%	$986	79.4%	$1,001	80.6%	$3,984	$4,967	$983	19.8%
18-Jul	80	.		.		.		.		.		.		.		.		.		$1,204	n/a	$1,032	85.7%	$1,068	88.7%	$3,304	$3,612	$308	8.5%
18-Aug	69	.		.		.		.		.		.		.		.		.		.		$1,106	n/a	$837	75.6%	$1,943	$2,212	$270	12.2%
18-Sep	64	.		.		.		.		.		.		.		.		.		.		.		$1,087	n/a				

Appendix A3. Total and average reimbursement for patients selected by RxRisk score and fitting inclusion criteria

Review month (RM)	# patients	17-Oct		17-Nov		17-Dec		18-Jan		18-Feb		18-Mar		18-Apr		18-May		18-Jun		18-Jul		18-Aug		18-Sep		Actual total	Projected total	Savings	
		$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM			$	%
Total reimbursement																													
17-Oct	62	$50,468	n/a	$38,983	77.2%	$45,464	90.1%	$42,675	84.6%	$35,685	70.7%	$51,533	102.1%	$30,843	61.1%	$52,775	104.6%	$40,561	80.4%	$54,131	107.3%	$55,092	109.2%	$39,571	78.4%	$537,780	$605,615	$67,835	11.2%
17-Nov	79	.		$94,512	n/a	$75,162	79.5%	$86,684	91.7%	$70,715	74.8%	$71,168	75.3%	$77,985	82.5%	$81,669	86.4%	$97,452	103.1%	$87,050	92.1%	$73,430	77.7%	$64,318	68.1%	$880,144	$1,039,634	$159,490	15.3%
17-Dec	55	.		.		$60,723	n/a	$66,782	110.0%	$49,035	80.8%	$67,519	111.2%	$58,579	96.5%	$75,281	124.0%	$64,894	106.9%	$66,710	109.9%	$64,590	106.4%	$68,866	113.4%	$642,979	$607,231	($35,748)	-5.9%
18-Jan	27	.		.		.		$29,436	n/a	$18,828	64.0%	$17,084	58.0%	$17,451	59.3%	$20,163	68.5%	$14,861	50.5%	$23,863	81.1%	$19,438	66.0%	$19,439	66.0%	$180,562	$264,922	$84,360	31.8%
18-Feb	57	.		.		.		.		$65,413	n/a	$28,000	42.8%	$39,155	59.9%	$32,949	50.4%	$27,921	42.7%	$58,306	89.1%	$53,974	82.5%	$27,123	41.5%	$332,839	$523,305	$190,465	36.4%
18-Mar	37	.		.		.		.		.		$38,876	n/a	$34,353	88.4%	$35,001	90.0%	$35,118	90.3%	$31,910	82.1%	$32,151	82.7%	$33,008	84.9%	$240,417	$272,133	$31,716	11.7%
18-Apr	23	.		.		.		.		.		.		$19,017	n/a	$18,056	94.9%	$12,983	68.3%	$11,496	60.5%	$11,715	61.6%	$8,933	47.0%	$82,202	$114,103	$31,901	28.0%
18-May	46	.		.		.		.		.		.		.		$53,051	n/a	$50,545	95.3%	$54,024	101.8%	$45,568	85.9%	$50,962	96.1%	$254,149	$265,253	$11,104	4.2%
18-Jun	52	.		.		.		.		.		.		.		.		$49,770	n/a	$42,993	86.4%	$52,845	106.2%	$43,230	86.9%	$188,838	$199,081	$10,243	5.1%
18-Jul	74	.		.		.		.		.		.		.		.		.		$88,591	n/a	$93,094	105.1%	$55,097	62.2%	$236,782	$265,773	$28,991	10.9%
18-Aug	37	.		.		.		.		.		.		.		.		.		.		$51,573	n/a	$53,105	103.0%	$104,678	$103,146	($1,532)	-1.5%
18-Sep	38	.		.		.		.		.		.		.		.		.		.		.		$44,928	n/a				
TOTAL																								TOTAL		$3,681,371	$4,260,196	$578,824	13.6%
Average reimbursement per patient																													
17-Oct	62	$814	n/a	$493	60.6%	$827	101.6%	$1,581	194.2%	$626	76.9%	$1,393	171.1%	$1,341	164.7%	$1,147	140.9%	$780	95.8%	$732	89.9%	$1,489	182.9%	$1,041	127.9%	$12,264	$9,768	($2,496)	-25.5%
17-Nov	79	.		$1,196	n/a	$1,367	114.3%	$3,211	268.4%	$1,241	103.7%	$1,923	160.8%	$3,391	283.5%	$1,775	148.4%	$1,874	156.7%	$1,176	98.4%	$1,985	165.9%	$1,693	141.5%	$20,831	$13,160	($7,671)	-58.3%
17-Dec	55	.		.		$1,104	n/a	$2,473	224.0%	$860	77.9%	$1,825	165.3%	$2,547	230.7%	$1,637	148.2%	$1,248	113.0%	$901	81.7%	$1,746	158.1%	$1,812	164.2%	$16,153	$11,041	($5,113)	-46.3%
18-Jan	27	.		.		.		$1,090	n/a	$330	30.3%	$462	42.4%	$759	69.6%	$438	40.2%	$286	26.2%	$322	29.6%	$525	48.2%	$512	46.9%	$4,724	$9,812	$5,087	51.8%
18-Feb	57	.		.		.		.		$1,148	n/a	$757	65.9%	$1,702	148.3%	$716	62.4%	$537	46.8%	$788	68.6%	$1,459	127.1%	$714	62.2%	$7,820	$9,181	$1,360	14.8%
18-Mar	37	.		.		.		.		.		$1,051	n/a	$1,494	142.1%	$761	72.4%	$675	64.3%	$431	41.0%	$869	82.7%	$869	82.6%	$6,149	$7,355	$1,206	16.4%
18-Apr	23	.		.		.		.		.		.		$827	n/a	$393	47.5%	$250	30.2%	$155	18.8%	$317	38.3%	$235	28.4%	$2,176	$4,961	$2,785	56.1%
18-May	46	.		.		.		.		.		.		.		$1,153	n/a	$972	84.3%	$730	63.3%	$1,232	106.8%	$1,341	116.3%	$5,428	$5,766	$338	5.9%
18-Jun	52	.		.		.		.		.		.		.		.		$957	n/a	$581	60.7%	$1,428	149.2%	$1,138	118.9%	$4,104	$3,828	($275)	-7.2%
18-Jul	74	.		.		.		.		.		.		.		.		.		$1,197	n/a	$2,516	210.2%	$1,450	121.1%	$5,163	$3,592	($1,572)	-43.8%
18-Aug	37	.		.		.		.		.		.		.		.		.		.		$1,394	n/a	$1,397	100.3%	$2,791	$2,788	($4)	-0.1%
18-Sep	38	.		.		.		.		.		.		.		.		.		.		.		$1,182	n/a				

Appendix A4. Total and average reimbursement for patients selected by variable rule and fitting inclusion criteria

Review month (RM)	# patients	17-Oct		17-Nov		17-Dec		18-Jan		18-Feb		18-Mar		18-Apr		18-May		18-Jun		18-Jul		18-Aug		18-Sep		Actual total	Projected total	Savings	
		$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM	$	% of RM			$	%
Total reimbursement																													
17-Oct	58	$20,582	n/a	$17,337	84.2%	$22,216	107.9%	$11,888	57.8%	$19,666	95.5%	$18,725	91.0%	$24,303	118.1%	$16,152	78.5%	$17,106	83.1%	$18,012	87.5%	$18,092	87.9%	$15,544	75.5%	$219,624	$246,985	$27,361	11.1%
17-Nov	32	.		$12,794	n/a	$9,730	76.1%	$9,326	72.9%	$8,844	69.1%	$11,144	87.1%	$6,731	52.6%	$7,354	57.5%	$6,154	48.1%	$7,816	61.1%	$9,536	74.5%	$7,067	55.2%	$96,496	$140,733	$44,237	31.4%
17-Dec	36	.		.		$11,729	n/a	$10,622	90.6%	$12,356	105.3%	$13,140	112.0%	$6,540	55.8%	$12,210	104.1%	$11,455	97.7%	$12,019	102.5%	$12,518	106.7%	$11,065	94.3%	$113,654	$117,288	$3,634	3.1%
18-Jan	25	.		.		.		$5,426	n/a	$2,386	44.0%	$4,455	82.1%	$4,569	84.2%	$4,604	84.9%	$4,190	77.2%	$3,885	71.6%	$4,110	75.7%	$3,081	56.8%	$36,706	$48,830	$12,124	24.8%
18-Feb	42	.		.		.		.		$14,020	n/a	$10,592	75.5%	$7,813	55.7%	$11,130	79.4%	$10,223	72.9%	$10,575	75.4%	$11,678	83.3%	$9,748	69.5%	$85,778	$112,156	$26,378	23.5%
18-Mar	29	.		.		.		.		.		$8,552	n/a	$9,578	112.0%	$7,544	88.2%	$5,876	68.7%	$6,808	79.6%	$5,418	63.4%	$5,200	60.8%	$48,975	$59,863	$10,888	18.2%
18-Apr	24	.		.		.		.		.		.		$2,210	n/a	$3,493	158.0%	$2,227	100.7%	$3,109	140.7%	$3,309	149.7%	$2,861	129.5%	$17,208	$13,257	($3,951)	-29.8%
18-May	32	.		.		.		.		.		.		.		$5,344	n/a	$4,649	87.0%	$2,276	42.6%	$4,256	79.6%	$4,948	92.6%	$21,474	$26,720	$5,247	19.6%
18-Jun	34	.		.		.		.		.		.		.		.		$7,725	n/a	$6,475	83.8%	$4,870	63.0%	$7,513	97.3%	$26,582	$30,900	$4,317	14.0%
18-Jul	52	.		.		.		.		.		.		.		.		.		$21,438	n/a	$16,679	77.8%	$19,179	89.5%	$57,296	$64,313	$7,017	10.9%
18-Aug	53	.		.		.		.		.		.		.		.		.		.		$22,451	n/a	$18,603	82.9%	$41,053	$44,901	$3,848	8.6%
18-Sep	39	.		.		.		.		.		.		.		.		.		.		.		$14,375	n/a				
TOTAL																								TOTAL		$764,846	$905,946	$141,100	15.6%
Average reimbursement per patient																													
17-Oct	58	$355	n/a	$542	152.6%	$617	173.8%	$476	133.9%	$468	131.9%	$646	181.9%	$1,013	285.2%	$505	142.2%	$503	141.7%	$346	97.6%	$341	96.2%	$399	112.3%	$6,210	$4,258	($1,952)	-45.8%
17-Nov	32	.		$400	n/a	$270	67.6%	$373	93.3%	$211	52.6%	$384	96.1%	$280	70.1%	$230	57.5%	$181	45.3%	$150	37.6%	$180	45.0%	$181	45.3%	$2,841	$4,398	$1,557	35.4%
17-Dec	36	.		.		$326	n/a	$425	130.3%	$294	90.2%	$453	139.0%	$273	83.6%	$382	117.0%	$337	103.3%	$231	70.9%	$236	72.4%	$284	87.0%	$3,240	$3,258	$18	0.6%
18-Jan	25	.		.		.		$217	n/a	$57	26.2%	$154	70.8%	$190	87.7%	$144	66.3%	$123	56.8%	$75	34.4%	$78	35.7%	$79	36.4%	$1,116	$1,953	$837	42.9%
18-Feb	42	.		.		.		.		$334	n/a	$365	109.4%	$326	97.5%	$348	104.1%	$301	90.0%	$203	60.9%	$220	66.0%	$250	74.8%	$2,347	$2,670	$324	12.1%
18-Mar	29	.		.		.		.		.		$295	n/a	$399	135.3%	$236	79.9%	$173	58.6%	$131	44.4%	$102	34.7%	$133	45.2%	$1,469	$2,064	$595	28.8%
18-Apr	24	.		.		.		.		.		.		$92	n/a	$109	118.6%	$65	71.2%	$60	65.0%	$62	67.9%	$73	79.8%	$462	$552	$90	16.3%
18-May	32	.		.		.		.		.		.		.		$167	n/a	$137	81.9%	$44	26.2%	$80	48.1%	$127	76.0%	$555	$835	$280	33.6%
18-Jun	34	.		.		.		.		.		.		.		.		$227	n/a	$125	54.9%	$92	40.5%	$193	84.9%	$636	$909	$273	30.0%
18-Jul	52	.		.		.		.		.		.		.		.		.		$412	n/a	$315	76.4%	$492	119.4%	$1,219	$1,237	$18	1.5%
18-Aug	53	.		.		.		.		.		.		.		.		.		.		$424	n/a	$477	112.5%	$901	$847	($53)	-6.3%
18-Sep	39	.		.		.		.		.		.		.		.		.		.		.		$369	n/a				